

**IMPACT OF SOCIAL AND INFORMATIONAL FAULTLINES ON
PATTERNS OF TRUST AND COORDINATION IN TEAMS**

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The Academic Faculty

by

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**IMPACT OF SOCIAL AND INFORMATIONAL FAULTLINES ON
PATTERNS OF TRUST AND COORDINATION IN TEAMS**

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SUMMARY

Although diversity is often thought to improve team performance by expanding the range of ideas available to the group, reported relationships between team diversity and performance have been somewhat weak (e.g., Bowers, Pharmer, & Salas, 2000; Devine & Philips, 2001; Webber & Donahue, 2001). One possible explanation for the lack of findings on team diversity is that past research has largely taken an absolute (i.e., how much diversity) rather than a relative perspective (i.e., what pattern of diversity; Tsui & O'Reilly, 1989; Tsui, Egan, & O'Reilly, 1992). Conceptually and operationally defining team diversity using faultlines – i.e., the pattern of how different types of demographic divisions either do or do not reinforce the salience of the subgroup – is one way to study diversity from a relative perspective. This thesis posits that the relative approach using faultlines may better elucidate the relationship between demography and team outcomes. In particular, this thesis posits that the structural arrangement of diversity (i.e., faultlines) among team members gives rise to relational patterns of trust and coordination, which in turn determine team performance. Results support the notion of a negative relation between faultline strength and team performance.

CHAPTER 1

INTRODUCTION

Two changes impacting the modern organization are diversification and decentralization. Traditional organizational forms are built around hierarchy (i.e., centralization of power), which implies clarity, order, and differentiation. In a hierarchical organization, there are clear demarcations in terms of who reports to whom (Krackhardt, 1994; Horner, 1997), and relationships are differentiated such that many individuals report to a fewer number of individuals in positions of power. Modern organizations are becoming increasingly flatter, and decentralized (Daft, 2009). Practically speaking, such decentralized structures are resulting from the widespread use of teams as a basic unit of work accomplishment (e.g., Hempel, Zhang, & Han, 2009). Power is being delegated to groups of individuals who collectively manage their work processes and are jointly accountable for meeting objectives.

The second change currently underway is the diversification of the workforce (Sawyer, Houlette, & Yeagley, 2006). Just three decades ago, organizations were relatively demographically homogeneous by today's standards (Robinson, Pfeffer, & Buccigrossi, 2003). In the second half of the 20th century, organizations employed fewer women, racial and ethnic minorities, and older individuals than are employed today. In the first half of the 21st century organizations will continue to diversify demographically, with white non-Hispanic individuals taking up a progressively smaller proportion the American workforce (Toossi, 2002). This thesis considers the implications of the combined effects of diversification and decentralization on team functioning.

As organizational structures are becoming more team-based (Horner, 1997) and diversifying demographically (Murrell & James, 2001), as well as individuals within these organizations becoming increasingly aware of the importance of diversification (Scott, Heathcote, & Gruman, 2011), the question is: in what ways is diversification beneficial, and in what ways might it be detrimental? The changes in structure and demography of organizations over the course of history have resulted in several classic findings related to team heterogeneity and homogeneity. For instance, the initial process and performance of demographically homogeneous teams surpasses that of heterogeneous teams, but over time diverse teams outperform homogeneous teams when recognizing problems and solutions to complex problems (Watson, Kumar, & Michaelsen, 1993), implying that diverse teams eventually gain a creative advantage over homogeneous teams. However, although demographic variables implicitly seem an interesting predictor variable in an era of such rapid organizational diversification and change, the results have, in large part, been underwhelming. Table 1 presents the effects sizes reported in past meta-analytic summaries of the effect of team composition on team performance. As you can see, these rho values range from -.24 to .40, with most falling close to 0.

Table 1

Summary of Published Meta-Analyses Relating Team Composition/Diversity to Team Performance

Citation	<i>k</i>	Predictor	Criterion	Type of Effect	Effect Size	Significant?
Bowers, Pharmer, & Salas, 2000	57	Ability	Team performance	Fisher's <i>Z</i>	-1.13	No
		Personality			-1.20	No
		Gender			-.38	No
		Heterogeneity			1.27	No
Devine & Philips, 2001	16	Highest cognitive ability score	Team performance	<i>r</i> : mean sample-weighted correlation	.21	No
	24	Cognitive ability mean			.29	Yes
	9	Cognitive ability standard deviation			-.03	No
	17	Lowest cognitive ability score			.25	No
Webber & Donahue, 2001	37	Diversity (age, gender, race/ethnicity, educational/functional background, industry/occupational background)	Team performance	ρ : estimated true correlation	-.01	No
	13	Less job-related variables (age, gender, race/ethnicity)			-.07	No
	24	More job-related variables (educational/functional background, industry/occupational background)			.02	No
Peeters, van Tuijl, Rutte, & Reyman, 2006	9	Extraversion	Team performance	ρ : estimated true correlation, corrected for unreliability in predictor and criterion measures and range restriction	.04	No
	9	Agreeableness			.25	Yes
	10	Conscientiousness			.21	Yes
	9	Emotional stability			.04	No
	6	Openness to experience			.03	No

Table 1 continued

Summary of Published Meta-Analyses Relating Team Composition/Diversity to Team Performance

Citation	<i>k</i>	Predictor	Criterion	Type of Effect	Effect Size	Significant?
Peeters, van Tuijl, Rutte, & Reyman, 2006	6	Extraversion variability	Team performance	ρ : estimated true correlation, corrected for unreliability in predictor and criterion measures	.06	No
	6	Agreeableness variability			-.12	Yes
	6	Conscientiousness variability			-.24	Yes
	6	Emotional stability variability			.02	No
	4	Openness to experience variability			-.01	No
Stewart, 2006	38	Aggregated characteristics (personality, cognitive ability, expertise)	Team performance	ρ : estimated true validity	.27	Yes
	20	Personality			.26	Yes
	10	Cognitive ability			.40	Yes
	14	Expertise			.16	Yes
	26	Heterogeneity			-.04	No
	26	Team size			.04	No
Bell, 2007	39	Conscientiousness	Team performance	ρ : corrected population correlation	.11	Yes
	29	Agreeableness			.12	Yes
	38	Extraversion			.09	Yes
	22	Emotional stability			.04	No
	25	Openness to experience			.05	No
	14	Collectivism			.25	Yes
	42	General mental ability			.27	Yes

Table 1 continued

Summary of Published Meta-Analyses Relating Team Composition/Diversity to Team Performance

Citation	<i>k</i>	Predictor	Criterion	Type of Effect	Effect Size	Significant?
Horowitz & Horowitz, 2007	15	Task-related diversity	Team performance quality Team performance quantity	ρ : weighted mean effect size	.13	Yes
	14	Bio-demographic diversity			-.01	No
	9	Task-related diversity			.07	Yes
	3	Bio-demographic diversity			-.02	No
Bell, Villado, Lukasik, Belau, & Briggs, 2011	31	Functional background	Team performance	ρ : corrected population correlation	.10	Yes
	13	Educational background variety			.01	No
	9	Education level mean			.01	No
	17	Organizational tenure mean			.08	Yes
	15	Team tenure mean			.09	No
	31	Race			-.11	Yes
	38	Sex			-.06	Yes
	40	Age			-.03	No
Roth, Purvis, & Bobko, 2012	61	Gender differences	Overall job performance	Corrected <i>d</i>	-.11	No
	50		Supervisory ratings		-.14	No
	8		Promotability		.11	No

Perhaps the true impact of diversity is somehow being masked. Relational demography is an area of research that seeks to use a group's *relative* rather than absolute demographic variables to predict outcomes; it is "the comparative demographic characteristics of members of dyads or groups who are in a position to engage in regular interactions" (Tsui & O'Reilly, 1989, p. 403). Thus, relational demography is a context-sensitive approach to looking at the effect of attribute variables on team-level outcomes. For example, it is not just about the effect of gender or race per se, but how said variables affect outcomes depending on the individual in comparison to the rest of the group. Classic research focusing on relative rather than absolute demographic predictors found that individuals who are demographically disparate from the other individuals in their team are less committed to their organization, more likely to be absent, and more likely to leave the organization (Tsui, Egan, & O'Reilly, 1992). Similar research has found that in terms of performance and attractiveness supervisors rate subordinates that are demographically dissimilar to themselves lower than they rate demographically similar subordinates, and individuals with demographically dissimilar superiors experienced greater role ambiguity than those with demographically similar superiors (Tsui & O'Reilly, 1989).

A related area of study is faultline research, which explores the existence and strength of factions between groups as predictor variables. Like in traditional relational demography research, faultline researchers conceptualize individuals attribute variables as context dependent; however, faultline research looks at the intersection of two or more attribute variables in a group context, and whether subgroups are made salient based on these variables or not (Thatcher & Patel, 2011; Thatcher & Patel, 2012). This area of

research can easily be linked to high profile current events involving diverse groups of people in the United States. For instance, recently students at University of California, Berkeley, demonstrated against the school's affirmative action policies in the form of a bake sale protest; baked goods cost \$2.00 for White students, \$1.50 for Asian students, \$1.00 for Latino students, \$0.75 for Black students, and \$0.25 for Native American students, with all females getting a \$0.25 discount (Curry, Dolak, & Katrandjian, 2011). The consequence of demonstrations such as this may be emphasizing group differences and the creation of factions (e.g., James, Brief, Dietz, & Cohen, 2001; Brief et al., 2005); in other words, events such as this make demographic faultlines highly salient. This has implications for conflict and reduced trust between groups (Li & Hambrick, 2005).

The overall relationships that have been reported between diversity and performance are weak; however, this is potentially inaccurate because previous studies have had an absolute rather than a relative perspective on diversity. In situations where traditional demographic variables are not strong predictors, the relational, faultline perspective may be able to elucidate the relationship between demography and team outcomes. For instance, say that a researcher is trying to predict team coordination, and finds neither age nor gender to be a significant predictor. This individual may find—using the same data—that from a relative rather than absolute perspective age and gender do indeed have an impact on coordination. So, this person might conclude that while age and gender do not predict coordination scores, looking at the constructs in a relative manner, and in conjunction, proves a more fruitful approach. Thus, the current study aims to look at how group structure along multiple dimensions of diversity, namely faultlines, impacts the emergence of trust and coordination in teams, and how trust and

coordination in turn impact performance. Additionally, the current research aims to use a combination of traditional psychometric and social network methodologies to address these questions.

Faultlines

“Faultlines divide a group’s members on the basis of one or more attributes. For instance, gender faultlines divide groups into male and female subgroups...[F]aultlines become stronger as more attributes align themselves in the same way” (Lau & Murnighan, 1998, p. 325-340). Faultlines capture the extent to which subgroups form based on multiple types of differences, and are one way of capturing the relative rather than absolute demography of a team. For example, consider a team of four people consisting of three Asian-American men from New York City and three African-American women from Los Angeles. This team exemplifies a very strong faultline, based on three variables; the race, gender, and hometown of these individuals. The faultline is strong because the subgroups formed by each of these demographic variables align perfectly. Faultlines are often researched in the context of team conflict.

Analogous geographic fault lines, which are surface traces of deep faults in the surface of the Earth and are predictive of where earthquakes are going to occur, social faultlines are hypothetically indicative of deeper social patterns of relations that will cause a group under pressure to rupture (Hart & Van Vugt, 2006). Methodologically, faultlines have been shown to be a stronger predictor than single-attribute heterogeneity indices for a variety of different team-level outcomes, such as expected performance (Lau & Murnighan, 2005).

Faultlines are theoretical divisions that split a group into subgroups based on

member differences, and they fall into two basic classes. Social category faultlines occur with regards to social category demographic variables of group members such as race, sex, or age. Contrastingly, information-based faultlines occur based on differences in job-related attributes of members, such as general mental ability or psychological collectivism (e.g., Thatcher & Patel, in press). Thus, it is possible to conceptualize the construct of faultlines as two distinct classes. However, it should be noted that some variables that create faultlines in groups are difficult to taxonomize in either of the two classes, such as geographic distribution, which is often confounded with nationality (e.g., Polzer, Crisp, Jarvenpaa, & Kim, 2006). In addition, the majority of previous research on faultlines has focused on social faultlines (Thatcher & Patel, 2011), perhaps because they are readily detectable. To expand, faultlines can be defined based on both surface- and deep-level characteristics (Harrison, Price, & Bell, 1998). Surface level characteristics are either those that are relatively visible/considered to be visible to the eye (e.g., age or race) or those that are common knowledge to members of a group (e.g., functional background or organizational tenure). On the other hand, deep-level characteristics are not apparent about individuals, and take time in order to determine; for instance, it takes some degree of time, effort, and communication to ascertain an individual's attitudes, personality, and/or values (Mohammed & Angell, 2004).

Additionally, in different situations faultlines can either be activated or dormant. While both activated and dormant faultlines are based on demographic characteristics, activated faultlines are actually perceived by individuals. Restated, a faultline becomes activated when something triggers an increase in the salience of relevant social identities, polarizing subgroups along the faultline (Chrobot-Mason, Ruderman, Weber, & Ernst,

2009). Groups with activated faultlines have been shown to be more likely to form coalitions and to have higher levels of group conflict, lower levels of satisfaction, and decreased group performance in contrast with groups with dormant faultlines (Jehn & Bezrukova, 2010).

Measuring Faultlines

Theoretically, faultline strength is how clear (or unclear) the division between subgroups within a group is, based on differences in social and informational categorization/identification. Methodologically, faultlines are captured by identifying social and informational categories and by grouping individuals into said categories. Then, faultline strength can be estimated by calculating the ratio of the between-group sum of squares to the total sum of squares, which reflects the amount of variation in overall group characteristics accounted for by the strongest group split (Thatcher, Jehn, & Zanutto, 2003). Detailed formulae for calculating faultline strength are presented in Table 2. Thus, what is important in the calculation of faultlines is not differences between groups, or even the relative difference within the team, but rather the pattern of how differences along one attribute align with differences along another attribute; when subgroups within the team are based on multiple attributes, they are more salient and therefore impactful than when subgroups are based on only one attribute.

Table 2

Formulae for Calculating Faultline Strength

Step	Formula
1: Subgroup Between SS	$\sum_{j=1}^{p=6} n_k^g \left(\bar{x}_{\bullet jk} - \bar{x}_{\bullet j\bullet} \right)^2$
2: Total Between SS	$\sum_{k=1}^2 \sum_{j=1}^{p=6} n_k^g \left(\bar{x}_{\bullet jk} - \bar{x}_{\bullet j\bullet} \right)^2$
3: Total Sum of Squares	$\sum_{k=1}^2 \sum_{j=1}^{p=6} \sum_{i=1}^{n_k^g} \left(x_{ijk} - \bar{x}_{\bullet j\bullet} \right)^2$
4: Fau (Faultline Strength)	$\frac{\sum_{k=1}^2 \sum_{j=1}^{p=6} n_k^g \left(\bar{x}_{\bullet jk} - \bar{x}_{\bullet j\bullet} \right)^2}{\sum_{k=1}^2 \sum_{j=1}^{p=6} \sum_{i=1}^{n_k^g} \left(x_{ijk} - \bar{x}_{\bullet j\bullet} \right)^2}$
5: Fau (Faultline Strength)	$\max_{g=1,2,\dots,7} (Fau_g)$

(Thatcher, Jehn, & Zanutto, 2003)

Correlates of Faultlines

An abundance of past research has found relations between faultlines (or faultline strength) and critical outcome variables for teams, such as performance; already, an abundance of research has indicated that faultlines are negatively associated with team performance (e.g., Homan, van Knippenberg, Van Kleef, & De Dreu, 2007). For instance, teams with activated gender faultlines tend to be less prolific and less creative (Pearsall, Ellis, & Evans, 2008), and teams with large demographic faultlines tend to experience more task and relational conflict, as well as behavioral disintegration, all of which lead to diminished performance (Li & Hambrick, 2005). Similarly, conflict has been shown to mediate the relation between demographic faultlines and both group organizational citizenship behaviors and performance (Choi & Sy, 2010); thus, faultlines reliably lead to team conflict, which in turn leads to diminished performance. Yet, although research has suggested that social category faultlines are negatively related to performance, there is no evidence of such a relation for information-based faultlines (Bezrukova, Jehn, Zanutto, & Thatcher, 2009). In addition to being negatively related to performance, meta-analytic results have indicated that demographic faultlines are negatively related to team satisfaction and cohesion and positively related to both task and relationship conflict (Thatcher & Patel, 2011). However, research has also demonstrated no relation between faultlines and performance when shared objectives are high (van Knippenberg, Dawson, West, & Homan, 2011).

Some research findings have indicated that faultlines have a curvilinear impact on outcomes, meaning that the processes and performance of teams with the weakest and strongest faultlines are impacted more negatively than those of teams with moderate

faultlines (Mannix & Neale, 2005). For instance, a curvilinear relationship has been suggested between faultlines and relationship and process conflict, morale, and performance (Thatcher, Jehn, & Zanutto, 2003). Similar research has found a curvilinear relation between constructs such as age heterogeneity (Richard & Shelor, 2002) and performance. However, this hypothesis has yet to be tested; most research reports linear relations between faultlines and outcome variables (Thatcher & Patel, 2011). This thesis considers two important aspects of team functioning likely to be impacted by faultlines: trust and coordination.

Trust

Trust is “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau, Sitkin, Burt, & Camerer, 1998, p. 395). Demographically, individuals tend to trust those that they consider to be similar others, and conversely are more likely to distrust those that they perceive as dissimilar (Li & Hambrick, 2005). This finding is linked theoretically to faultline theory because the perception of faultlines within a group should engender feelings of mistrust. Although strong faultlines don’t increase the diversity of the team, the patterning or alignment in differences that occurs when there are strong faultlines makes existing differences more salient, thereby increasing the frequency of “us versus them” social comparisons (Thatcher & Patel, 2011). Indeed, informational faultlines—specifically, geographic faultlines in distributed teams—have been found to lead to increased levels of conflict and decreased levels of trust (Polzer, Crisp, Jarvenpaa, & Kim, 2006). Conversely, dyads with shared characteristics in teams with strong faultlines experience higher levels of trust and less conflict than dyads without shared

characteristics (Wiggins, 2009).

Coordination

Coordination is “the process of orchestrating the sequence and timing of interdependent actions” (Marks, Mathieu, & Zaccaro, 2001, p. 367-368); at the multiteam system level coordination is “aligning and sequencing and timing of interdependent action” (DeChurch & Marks, 2006). Perceived faultlines in teams have been shown to reduce knowledge coordination, a crucial antecedent of performance, and knowledge coordination has been shown to fully mediate the effect of perceived faultlines on performance, in distributed teams (Shen, Gallivan, & Tang, 2008). So, when individuals perceive a faultline dividing their team into subgroups, they are less likely to coordinate across that faultline, and subsequently their performance is reduced. Additionally, communication is a form of explicit coordination (Fiore, Salas, Cuevas, & Bowers, 2003), as stated previously, and is also an important consequence of faultlines. For instance, when compared to demographically dissimilar individuals, demographically similar individuals have been shown to engage in increased levels of communication, when compared to demographically dissimilar individuals. It follows that the formation of smaller factions within a larger group not only impedes general group functioning but also, more specifically, encumbers verbal communications (Lau & Murnighan, 1998).

Teams as Networks

Traditionally defined, a team is "a distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal/object/mission, who have each been assigned specific roles or functions to perform, and who have a limited life span of membership” (Salas, Dickinson, Converse, &

Tannenbaum, 1992, p. 4). Teams inherently involve human social interaction; even virtual—or distributed—teams involve interactions, albeit with the assistance of technology. The study of social networks focuses on better understanding complex relationships, or ties, between individuals, or actors, in order to predict human behavior. Thus, the intrinsically social nature of teams allows them to be conceptualized as networks. Specifically, from a networks perspective a group/team is defined in one of two ways: either as fully connected—or at least almost fully connected—actors within a population, or as an exogenously-determined categorization of individuals (Katz, Lazer, Arrow, & Contractor, 2004). Actors, which are also called nodes, can represent a variety of variables, including people, organizations, and concepts (Borgatti & Foster, 2003). However, for the purposes of team-based research, networks in which actors are individuals are the most relevant.

There are a wide variety of ties that connect actors in networks. Ties can connect actors who are all of the same type, for example, ties among individuals in teams. Ties can also describe the relationships among multiple types of actors (i.e., bipartite networks; Hanneman & Riddle, 2005), for example, ties between people and teams where linkages occur when individuals are members of the same team. In addition, ties can be defined in terms of their content. Commonly studied team ties include communication, or which individuals speak to or message one another affective ties, such as trust or love ties, material/work flow ties, such as which individual gives money to which other individual, and cognition, such as which actors know or do not know one another. The ties in a network can be directed or undirected. Directed networks carry meaning in the direction of ties; trust networks capture important differences in terms of which actors

trust which other actors. Undirected networks describe relations among actors when the direction is not meaningful. Undirected networks include friendship (i.e., as operationalized on Facebook), sexual intercourse, or prior affiliation on the same team. The ties in a network can also describe the intensity or strength of relations among actors. For example, communication networks can capture the frequency communication.

An advantage of the addition of the network approach to studying teams is that it facilitates the study of phenomena that are distinct at different levels of analysis. The tie structure of a network can reflect relations at various levels of analysis: for instance, dyadic, triadic, and group-level relations can be assessed through looking at reciprocity, transitivity, and density, respectively. Thus, using network analytic methods, the most appropriate level of analysis can be chosen for the research question at hand.

Emergent States

The network approach provides a valuable way to examine compilational emergence in teams. The content of the ties among individuals is used to capture emergent states and processes. Emergent states are “the conditions that dynamically enable and underlie effective teamwork” (DeChurch & Mesmer-Magnus, 2010, p. 33). They evolve in a team based on interactive processes (Jehn, Greer, Levine, & Szulanski, 2008), and are motivational, cognitive, or affective in nature. Team processes impact emergent states, and emergent states link inputs and processes with outcomes (Mathieu, Gilson, & Ruddy, 2006); an example of an emergent state is trust. Contrastingly, emergent processes relate to teammate interaction and behavioral synchronization (DeChurch & Mesmer-Magnus, 2010), and an example is coordination. The current research focuses on these two states because of their critical nature in terms of team

functioning. For instance, previous research has indicated that trust is a deciding factor in the formation of team cognition (Rico, Sanchez-Manzanares, Gil, & Gibson, 2008), and has a strong impact on team members' attitudes toward the organization, perceived performance, satisfaction, and continuance and attitudinal commitment (Costa, 2003); trust is a sort of fundamental glue that maintains the cohesion of a team. Coordination is just as imperative for a team to succeed. Especially in today's world of virtual, distributed teams, the ability to coordinate and communicate effectively is not trivial. Accordingly, coordination is closely related to team performance (Massey, Montoya-Weiss, & Hung, 2003).

Trust

The emergence of trust, or team members allowing themselves to be vulnerable to one another, enhances information sharing and synergy, and thus increases overall team effectiveness (Curşeu & Schruijer, 2010). Research has indicated that trust enhances team member viability, and conflict can diminish perceptions of trust within a team (Jehn et al., 2008). In particular, trust mediates the relation between conflict and performance, partially for task conflict and fully for relationship conflict. Also, trust is less impacted by task conflict when team members are highly cognitively synchronized, and less affected by relationship conflict when team members are highly connected in terms of the task at hand (Rispens, Greer, & Jehn, 2007). Previous research has also found that trust is closely related to the social identities of the group members. For instance, in situations of low identity threat—when individuals do not feel that they will be evaluated negatively based on their group membership—trust can be created in demographically heterogeneous groups by making salient a common identity. Research has also shown

that imposing a common in-group identity in a heterogeneous team can lead to increased levels of trust (van der Zee, Vos, & Luijters, 2009).

In addition, research on internationally distributed teams has indicated that the same norms that reinforce social interactions also enhance trust, including: acknowledging of individual member contributes, exchanging personal information, motivating one another, providing positive feedback, and exchanging opinions (Koelher, 2004). Furthermore, trust in virtual teams has been shown to emerge more as a cognitive and less as an affective state (Kanawattanachai & Yoo, 2002; Iacono & Weisband, 1997). Additionally, although both low- and high-performing virtual teams have around the same levels of cognitive and affective trust early in their lifespans, high-performing teams are singularly able to cultivate and sustain trust throughout time (Kanawattanachai & Yoo, 2002).

Coordination

Coordination is an emergent process, of which there are two principal types. Explicit coordination, which is the more commonly studied of the two, includes team-level behaviors such as communication and planning, while “[i]mplicit coordination takes place when team members anticipate the actions and needs of their colleagues and task demands and dynamically adjust their own behavior accordingly, without having to communicate directly with each other or plan the activity” (Rico, Sánchez-Manzanares, Gil, & Gibson, 2008, p. 164). Team coordination can be effectively achieved on a long term basis through team norms being internalized and high internal sanctions, such as feelings of guilt related to lack of coordination, being in place (Antonetti & Rufini, 2008).

Coordination is particularly important in project teams because it allows team members to become organized and work efficiently toward a common goal. Project teams members most often need to coordinate with one another due to task interdependencies or changes occurring in the project development process (Hoegl, Weinkauff, & Gemuenden, 2004). Both collocated and distributed teams make coordination efforts; namely, communication amongst team members tends to be the primary form of coordination in both situations. However, distributed teams have the added challenge of having to coordinate their communication efforts, oftentimes using virtual tools (Massey, Montoya-Weiss, & Hung, 2003).

Communication

As aforementioned, communication is a type of explicit coordination, and is generally associated with positive outcomes. For instance, research on geographically distributed teams has shown that spontaneous communication is associated with individuals sharing an identity and/or context, and spontaneous communication also has been shown to mitigate the effect of geographic distribution on conflict (Hinds & Mortensen, 2005). Moreover, additional recent research on distributed teams has found that the medium of communication impacts the content of what is imparted. For example, meta-analytic research has shown that when communicating using virtual means, the uniqueness of information shared is enhanced, but the openness of information sharing is reduced (Mesmer-Magnus, DeChurch, Jimenez-Rodriguez, Wildman, & Shuffler, 2011). In fact, it has been suggested that geographically distributed teams experience more salient faultlines than collocated teams (Ryan, 2010), a proposition that would explain many of these results. For instance, Hinds and

Mortensen's (2005) finding can be understood from a faultline lens: groups with members that vary in terms of location and/or identity tend to experience a faultline rift, and this is reflected through spontaneous communication patterns.

The Relation Between Trust and Communication

Trust and communication are not mutually exclusive constructs; on the contrary, the two commonly co-occur and recent research has suggested that the variables are causally related to one another. In relation to communication, trust has been conceptualized as both an antecedent and a consequent in previous literature (e.g., Jarvenpaa & Leidner, 1999; Jarvenpaa, Shaw, & Staples, 2004). This phenomenon of co-occurrence can also be understood as attitude-behavior consistency (Borgida & Campbell, 1982).

Theoretically, it has been suggested that coordination is accomplished in virtual teams through trust and open communication (Jarvenpaa, Knoll, & Leidner, 1998). This theory has been empirically supported through research on distributed teams; for instance, the results of a study using multiplayer online role-playing games indicated that while trust positively impact success, low levels of trust can lead to problems stemming from lack of coordination (Chen, 2009). Meyerson, Weick, and Kramer (1996) theorized that trust in temporary teams develops at a much "swifter" pace than that of a more permanent group. Indeed, research has shown that in virtual teams, which are often temporary, both the frequency and volume of task-oriented communications between teammates impacts the initial development of cognition-based trust (Kanawattanachai & Yoo, 2007). Moreover, although these teams tend to establish trust very quickly initially, this state is usually fleeting in nature. However, communication behaviors can facilitate

the formation of more stable trust relations in distributed teams, while irregular or unpredictable communication behaviors can hinder the development of trust (Jarvenpaa & Leidner, 1999). Co-occurring high levels of trust and communication are also related to increased team performance (Iacono & Weisband, 1997). Later in a virtual team's lifespan, it has been found that trust moderates the relation between team communication and members' attitudes and perceptions of task quality (Jarvenpaa, Shaw, & Staples, 2004).

Dyadic Processes in Teams

Reciprocal relations between human beings are truly some of the most critical underpinnings of our dynamic social worlds. "The norm of reciprocation—the rule that obliges us to repay other for what we have received from them—is one of the strongest and most pervasive [human] social forces...[Reciprocity] helps us build trust with others and pushes us toward equity in our relationships" (Cialdini & Goldstein, 2004, p. 599). For instance, when an individual becomes ill or disabled, her subjective well-being declines. The mechanism for this decline is thought to be due, in large part, to social circumstances surrounding the impairment—if the individual is rendered less able to reciprocate social support to others, then the quality of her relationships may suffer (Pinquart & Sörensen, 2000). In a similar vein, it has been posited that communication reciprocity is a critical factor in differentiating mentally ill from mentally healthy individuals; individuals that are unable to reciprocate communications to other tend to be afflicted with some sort of mental illness, essentially (Albrecht & Adelman, 1984). In addition, it has been found that an individual is 171% more likely to become obese if an individual who reciprocates her friendship becomes obese, when compared with

individuals that do not reciprocate friendship, spouses, siblings, and neighbors (Christakis & Fowler, 2007). Furthermore, norms of reciprocity often guide workplace behaviors, but individuals tend to engage in reciprocation to different degrees, depending on who the target of the interaction is (Settoon, Bennett, & Liden, 1996). Thus, reciprocal social ties with others are critical to our happiness but can also have detrimental impacts to our health and welfare, and reciprocation is not only a behavior but also a guiding force in everyday life. Reciprocity is especially relevant when considering trust and coordination relations because of the unique implications associated with unidirectional trust/coordination ties.

Faultlines and Dyadic Processes

In groups with strong faultlines, there is a clear divide between subgroups based on two or more attributes (Thatcher, Jehn, & Zanutto, 2003); thus, although faultlines take a toll on group processes and performance (Jehn & Bezrukova, 2010; Thatcher & Patel, 2011; Thatcher & Patel, 2012), the homogenous subgroups created by faultlines may be more prone to trust (Williams, 2001) and coordinate with individuals within their subgroup (Bowers, Pharmer, & Salas, 2000), with similar others. This phenomenon can best be explained by the principle of homophily. People tend to come in contact more with similar than dissimilar people, and thus information tends to be localized in certain ways based on a network's social characteristics (McPherson, Smith-Lovin, & Cook, 2001). A theory that expands on the concept of homophily is intergroup bias, which states that individuals tend to trust, cooperate with, empathize with, and generally positively regard/evaluate their in-groups, or groups in which they are members, more than their out-groups, or groups in which they are not members (Hewstone, Rubin, &

Willis, 2002). So, people will spend more time with similar others, and will have higher levels of positive affect toward these in-group members as well. Furthermore, the similarity-attraction paradigm states that demographic similarity leads between individuals leads to perceived similarity of attitudes and values, which in turn leads to interpersonal attraction (Graves & Powell, 1995). So, a dyad that shared the same race or gender will have an initial positive bias toward each other. This theory also posits that individuals will communicate more with similar others, and will apply negative assumptions to dissimilar others (Jehn, Bezrukova, & Thatcher, 2008). All of these theories stand to explain why subgroups of individuals with similar characteristics would stand to trust and coordinate more with one another than they would with individuals outside their subgroup.

In addition, social categorization theory (Tajfel, 1982) can be used to explain why subgroup members trust and coordinate more with each other than with members of out-groups. This theory posits that individuals cognitively organize their social world based on observed similarities and differences between individuals. Individuals will tend to view in-groups as highly heterogeneous and out-groups as highly homogeneous. Thus, people tend to dehumanize out-group members, and value in-group members, and this pattern of discrimination will affect affective (e.g., trust) and behavioral reactions (e.g., coordination) states when interacting with in-groups and out-groups. Therefore, based on previous research and theory, it is hypothesized that:

Hypotheses 1 and 2: Social (H1) and informational (H2) faultline strength will positively predict subgroup trust (H1a, H2a) and coordination (H1b, H2b) reciprocity among members of the same subgroup.

Research has demonstrated that demographic individual differences progressively have less of an impact on group social processes, while informational individual differences increasingly matter more (Harrison, Price, & Bell, 1998). This finding makes sense intuitively; when first introduced to a group of people, one can usually visually determine their social identities, with few exceptions (e.g., sexual identity, certain disabilities, etc., are invisible). Thus, social categorizations occur from the moment that the group assembles, while informational variables are oftentimes not visible (e.g., personality traits, tenure; Jehn, Bezrukova, & Thatcher, 1998), and thus take time to discover about others. Sawyer, Houlette, and Yeagley (2006) proposed time as a moderator of surface- versus deep-level diversity, stating that: “Deep level diversity relates to those attributes of the individual such as attitudes, beliefs and values that take time to emerge from interpersonal interaction” (p. 2). However, as time passes, information regarding individuals’ deep-level characteristics is acquired, and takes the place of social characteristic information in terms of mediating social processes. Accordingly, it can be posited, based on previous research, that demographic and informational faultlines will follow a similar trend in terms of their impact on dyadic level group processes—namely, reciprocal trust and coordination/communication:

Hypothesis 3: Social faultline strength will positively predict early subgroup trust (H3a) and coordination (H3b) reciprocity more strongly than will informational faultline strength, while informational faultline strength will positively predict later subgroup trust (H3c) and coordination (H3d) reciprocity more strongly than will social faultline strength.

Dyadic Processes and Performance

Trust, an affective understanding that a particular individual will not exploit one's vulnerabilities, is critical for teamwork because it allows for effective cooperation and collaboration. If members of a team have doubts each other's trustworthiness, or feel like certain individuals on the team might indeed exploit the vulnerabilities of other members, the team will be less able to cooperate, collaborate, and coordinate, and thus will be less effective (e.g., Sabel, 1993; Simons & Peterson, 2000; Lewicki, McAllister, & Bies, 1998). Previous literature has demonstrated that trust in teams reliably predicts a number of important, team-relevant outcomes, such as positively predicting attitudes toward the organization, attitudinal commitment, team performance, and team satisfaction, and negatively predicting continuance commitment—or the motivation to remain with an organization for calculated reasons (e.g., financial reasons; Costa, 2003). Similarly, coordination has also been positively related to team performance in previous literature (Tsai, 2002). Because teamwork virtually always involves some sort of shared task, it is critical that team members successfully interact with and rely information to one another in order to accomplish their common goal. Without the ability to coordinate, teams would not be able to transition and act effectively. Coordination is an especially critical emergent state in action teams, where the consequences of lacking it could even be fatal; for instance, a behavioral that surgical teams are assessed on is their coordination processes (Healey, Undre, & Vincent, 2004).

However, although high levels of trust and coordination usually lead to increased performance, there are group structures that can diminish and even reverse that effect. To elaborate, when a team experiences the formation of subgroups (specifically, the

formation of subgroups based on demographic faultlines), those smaller groups will likely experience less conflict. However, the divided team, taken as a whole, is more likely to experience an “us-versus-them” mentality,” as well as increased conflict, increased distrust, and decreased trust (Thatcher & Patel, 2011), which are negative correlates of team performance. Thus, based on aforementioned research and theory, is it posited that:

Hypothesis 4: Subgroup trust (H4a) and coordination (H4b) reciprocity will negatively predict team performance.

Trust & Coordination as Mediators

Furthermore, I expect trust and coordination reciprocity to mediate the relation between faultline strength and team performance. Restated, trust and coordination reciprocity will be the mechanisms by which faultline strength impacts team performance. As explicated previously, Hypotheses 1 and 2 predict positive relations between social and informational faultline strength and subgroup trust and coordination reciprocity; as faultline strength increases, or as subgroup homogeneity increases, so too will the tendency for individuals to reciprocate trust and coordination ties within their subgroups. Moreover, Hypothesis 4 posits a negative relation between subgroup trust and coordination reciprocity—the criterion variables from Hypotheses 1 and 2—and team performance; the formation of coalitions, as indicated by high levels of within-subgroup reciprocity, will negatively impact team-level performance. Taken together, these hypotheses specify a causal network in which subgroup trust and coordination reciprocity fully mediate the relations between social and informational faultline strength and team performance. In other words, social and informational faultline strength will

only affect performance via their relations with trust and coordination reciprocity, and not directly. The model specifies full rather than partial mediation because I expect subgroup-level reciprocity to account entirely for the relation between faultline strength and team performance, meaning that the relation between faultline strength and team performance should be null when reciprocity is included in the model. Accordingly, it is put forth that:

Hypothesis 5: Subgroup trust (H5a) and coordination (H5b) reciprocity will mediate the relation between social faultline strength and team performance.

Hypothesis 6: Subgroup trust (H6a) and coordination (H6b) reciprocity will mediate the relation between informational faultline strength and team performance.

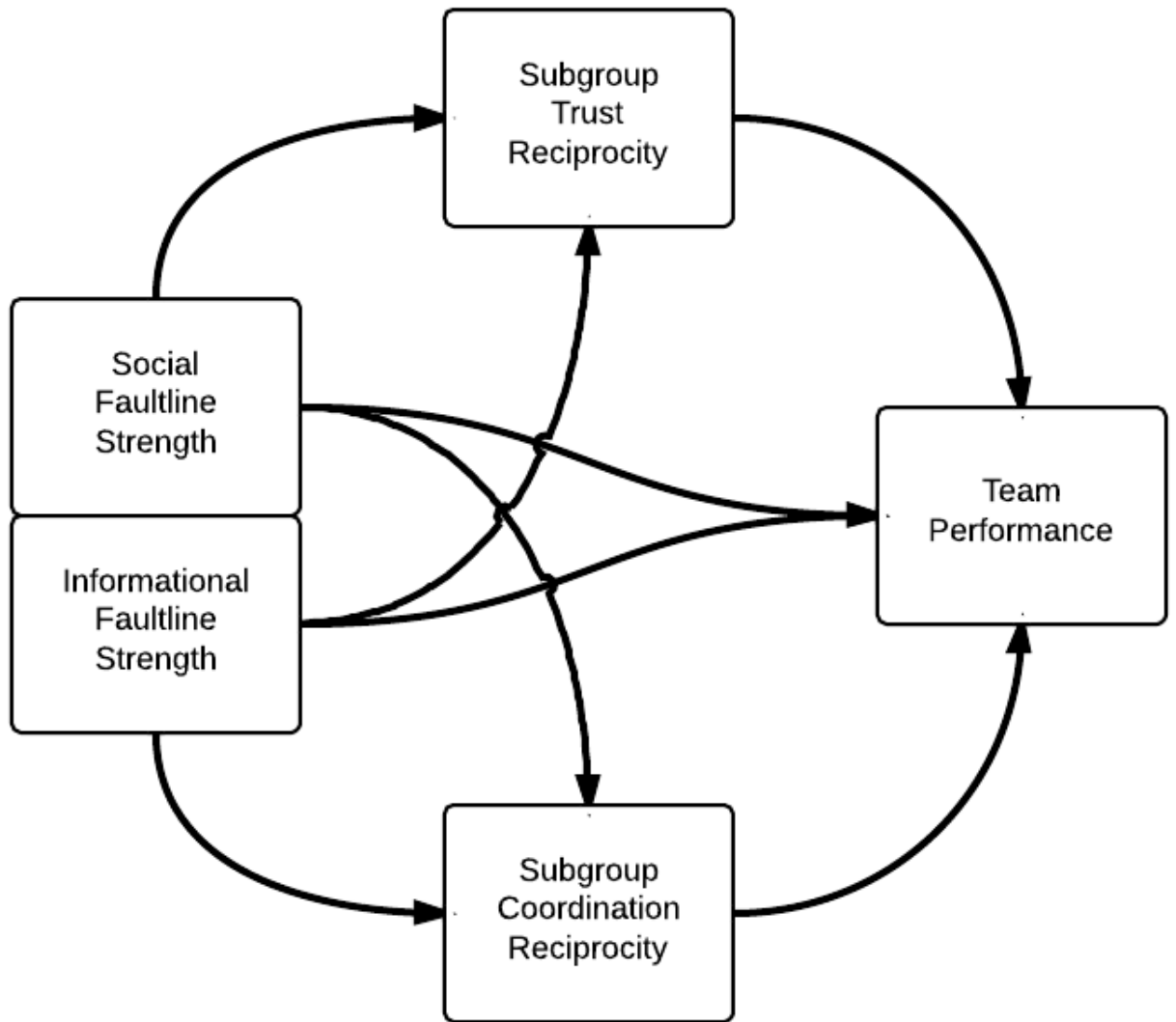


Figure 1. Theoretical model of the relation between faultline strength, trust and coordination reciprocity, and team performance.

Intersection of Faultline and Network Theory

Surprisingly, the intersection of faultline and network theory has been fairly limited to date. Only a small number of studies have truly united the two literatures (e.g., Lawrence, 2006; Ryan, 2007; Trezzini, 2008; Balkundi, Kilduff, Barsness, & Michael, 2006). One such study looked at the effect of faultlines on team processes and performance, and found that performance improved when friendship ties cut across cultural faultline subgroups, but relationship conflict increased and performance suffered when animosity ties cut across cultural faultline subgroups (Ren, 2008).

Theoretically, it has been a fairly common suggestion to combine faultline and network theory. For instance, it has been proposed that induced homophily, which arises as a consequence of the homogeneity of structural opportunities for interaction (Kossinets & Watts, 2009), may explain faultline splits (Lawrence, 2006). In addition, internal boundary spanning has been conceptualized as being defined by the activities that bridge faultlines (Ryan, 2007), and structural holes have been hypothesized to indicate faultlines (Balkundi, Kilduff, Barsness, & Michael, 2006).

There are a number of other rationales for why faultline and network theory should be united. For example, network analysis is particularly useful when analyzing networks with two clearly defined cliques (Espinosa, Cummings, Wilson, & Pearce, 2003); in other words, it is robust in the situation of a group with one clearly defined faultline. Moreover, the theories are compatible in terms of the ideas that they purport. Both theories emphasize contextual factors; faultline theory applies social identity and self-categorization theory, while network research is oftentimes focused purposely on the

context of the specific network being studied. Additionally, homophily and heterophobia are social mechanisms that are relevant to both theories (Flache & Mäs, 2008).

CHAPTER 2

METHOD

These ideas were tested in a sample of 226 student participants organized into 27 teams to perform a semester-long class project. The original sample contained 268 participants organized into 32 teams, but due to the fact that faultline scores have to be calculated with complete demographic data (i.e., gender, age, narcissism, and psychological collectivism), 5 teams were excluded from analyses because of missing data. Specifically, the entire dataset was left with 9 missing values from 5 teams. Of these values, 88.89% (or, 8 pieces) were missing from French management students. Each individual with a missing value for narcissism was also missing a value for psychological collectivism; so, in other words, the dataset lacked psychometric data for 4 French students. The 5 teams with missing data were excluded from analyses, leaving the final sample of 27 teams. Little's (1988) Missing Completely at Random (MCAR) test was carried out to verify that missing values in the dataset are independent of measured variables as well as unobservable parameters. The resulting test statistic, displayed in Table 3, was not significant, meaning the data are indeed missing completely at random. When data are missing completely at random, this means that the probability that any given observation is missing is unrelated to the value of that observation or to any other variable. Alternatively, data can be missing at random (MAR) or missing not at random (MNAR). If data are missing at random, this means that the probability that any given observation is missing is unrelated to the value of that observation but is related to the value of another variable. Data that are missing not at random are not

capable of being classified as either MCAR or MAR, and their missingness is nonignorable (Heitjan & Basu, 1996; Howell, 2007).

Table 3

Results of Little's Missing Completely at Random Test

Variables Included in Model	χ^2	<i>df</i>	<i>p</i> value
1. Area of Functional Expertise	8.34	9	.50
2. Team			
3. Age			
4. Gender			
5. Narcissism (mean)			
6. Psychological collectivism (mean)			

Participants

Ecology and psychology students were recruited from a university on the east coast of the United States, and business students were recruited from a university in southeastern France. Students at both schools—in all 3 areas of functional expertise — were enrolled in a course that involved a semester-long cross-national project; so, all students (consenting and non-consenting) had to complete the project, but only data from consenting students was used in analyses. Participants were each randomly assigned to a functional expertise group within their class, and these groups were subsequently randomly assigned to global teams. Each team consisted of 3 sub-teams, 1 from each area of functional expertise. Sub-team size ranged from 2 to 4, and team size ranged from 8 to 9. The sample was comprised of 226 participants organized into 27 teams.

A Priori Power Analyses

Due to the small overall sample size, a priori power analyses were conducted to determine alpha needed to detect a small, medium, and large effect size. Cohen's f^2 effect size for a multiple regression was used as the basis for said analyses:

$$f^2 = \frac{R^2}{1 - R^2}$$

In this formula, R^2 equals the squared multiple regression coefficient. Cohen's f^2 was chosen as the measure of effect size to use for this study because it is appropriate when carrying out multiple regressions.

Sample Size

Table 4 illustrates the results of the a priori sample size power analyses. Sample size, N , was computed as a function of: number of predictors; power level ($1-\beta$), which was consistently set at .80; significance level (α); and anticipated population effect size

(f^2). At an alpha level of .05, the minimum sample sizes needed to detect an effect were as follows: 395 participants to detect a small ($d=.20$ or $f^2=.02$) effect; 55 participants to detect a medium ($d=.50$ or $f^2=.15$) effect; and 25 participants to detect a large ($d=.80$ or $f^2=.35$) effect. However, at an alpha of .10, the minimum sample sizes needed to detect an effect were as follows: 311 participants to detect a small effect; 43 participants to detect a medium effect; and 20 participants to detect a large effect. According to a recent meta-analysis on faultline research, effect sizes for studies in this area tend to be relatively small. For instance, the correlations between 6 different individual difference variables and team performance ranged from -.03 to -.07, and data from 39 independent studies suggested the correlation between demographic faultline strength and team performance to be -.14 (Thatcher & Patel, 2011). These coefficients are small based on Cohen's (1988) standards, which identify .10 as a small and .30 as a medium correlation coefficient. Thus, this suggests the possibility that, due to the current study's low sample size and the expectation of small effects in the variables of interest, failing to detect true relationships is more likely than mistakenly accepting false relationships.

Sensitivity

Further a priori power analyses were performed to gauge sensitivity, or to determine—for each planned analysis—what effect size may potentially be detected given a certain power level, alpha level, and sample size. Specifically, effect size (f^2) was computed as a function of: number of predictors; sample size (N); power level ($1-\beta$), which was consistently set at .80; and significance level (α). For the current study, when alpha is set at .05, the minimum observed effect size would need to be $f^2=.31$ in order to achieve statistical significance, depending on the specific constraints of the particular

analysis. But, when alpha is set at .10, the effect size needed to achieve statistical significance be $f^2=.24$. Table 5 displays the full set of sensitivities across all included analyses. With this, alpha has been set at .10, due to the current study's small sample size. In the current study, the tradeoff between observing a false positive (Type I error) and the overall expected error rate (summation of the probability of Type I or Type II errors) is more reasonably balanced when utilizing the more liberal alpha level of .10 than when employing the standard .05 level.

Table 4

Team-Level Sample Size Necessary to Reliably Detect an Effect Given a Theoretical Effect Size and Critical Alpha Level

	Hypothesis	Predictor	Criterion	Effect Size ($\alpha=.05$)			Effect Size ($\alpha=.10$)		
				Small	Medium	Large	Small	Medium	Large
Social	1a, 3a, 5a	Faultline Strength	Early Subgroup Trust Reciprocity	395	55	25	311	43	20
	1b, 3b, 5b	Faultline Strength	Early Subgroup Coordination Reciprocity	395	55	25	311	43	20
	1a, 3c, 5a	Faultline Strength	Later Subgroup Trust Reciprocity	395	55	25	311	43	20
	1b, 3d, 5b	Faultline Strength	Later Subgroup Coordination Reciprocity	395	55	25	311	43	20
	5	Faultline Strength	Team Performance	395	55	25	311	43	20
	4a, 5a	Early Subgroup Trust Reciprocity	Team Performance	395	55	25	311	43	20
	4b, 5b	Early Subgroup Coordination Reciprocity	Team Performance	395	55	25	311	43	20
	4a, 5a	Later Subgroup Trust Reciprocity	Team Performance	395	55	25	311	43	20
	4b, 5b	Later Subgroup Coordination Reciprocity	Team Performance	395	55	25	311	43	20

Table 4 continued

Team-Level Sample Size Necessary to Reliably Detect an Effect Given a Theoretical Effect Size and Critical Alpha Level

Informational	2a, 3a, 6a	Faultline Strength	Early Subgroup Trust Reciprocity	395	55	25	311	43	20
	2b, 3b, 6b	Faultline Strength	Early Subgroup Coordination Reciprocity	395	55	25	311	43	20
	2a, 3c, 6a	Faultline Strength	Later Subgroup Trust Reciprocity	395	55	25	311	43	20
	2b, 3d, 6b	Faultline Strength	Later Subgroup Coordination Reciprocity	395	55	25	311	43	20
	6	Faultline Strength	Team Performance	395	55	25	311	43	20
	4a, 6a	Early Subgroup Trust Reciprocity	Team Performance	395	55	25	311	43	20
	4b, 6b	Early Subgroup Coordination Reciprocity	Team Performance	395	55	25	311	43	20
	4a, 6a	Later Subgroup Trust Reciprocity	Team Performance	395	55	25	311	43	20
	4b, 6b	Later Subgroup Coordination Reciprocity	Team Performance	395	55	25	311	43	20

Note. Power = .80. Cohen's (1988) conventions for effect size were used during power analyses: small effect, $d=.20$ ($f^2=.02$); medium effect, $d=.50$ ($f^2=.15$); and large effect, $d=.80$ ($f^2=.35$).

Table 5

Observed Effect Size Needed to Achieve Significance Given Sample Size and Critical Alpha Level (N=27)

	Hypothesis	Predictor	Criterion	$\alpha=.05$	$\alpha=.10$
Social	1a, 3a, 5a	Faultline Strength	Early Subgroup Trust Reciprocity	.31	.24
	1b, 3b, 5b	Faultline Strength	Early Subgroup Coordination Reciprocity	.31	.24
	1a, 3c, 5a	Faultline Strength	Later Subgroup Trust Reciprocity	.31	.24
	1b, 3d, 5b	Faultline Strength	Later Subgroup Coordination Reciprocity	.31	.24
	5	Faultline Strength	Team Performance	.31	.24
	4a, 5a	Early Subgroup Trust Reciprocity	Team Performance	.31	.24
	4b, 5b	Early Subgroup Coordination Reciprocity	Team Performance	.31	.24
	4a, 5a	Later Subgroup Trust Reciprocity	Team Performance	.31	.24
	4b, 5b	Later Subgroup Coordination Reciprocity	Team Performance	.31	.24
Informational	2a, 3a, 6a	Faultline Strength	Early Subgroup Trust Reciprocity	.31	.24
	2b, 3b, 6b	Faultline Strength	Early Subgroup Coordination Reciprocity	.31	.24
	2a, 3c, 6a	Faultline Strength	Later Subgroup Trust Reciprocity	.31	.24
	2b, 3d, 6b	Faultline Strength	Later Subgroup Coordination Reciprocity	.31	.24
	6	Faultline Strength	Team Performance	.31	.24
	4a, 6a	Early Subgroup Trust Reciprocity	Team Performance	.31	.24
	4b, 6b	Early Subgroup Coordination Reciprocity	Team Performance	.31	.24
	4a, 6a	Later Subgroup Trust Reciprocity	Team Performance	.31	.24
	4b, 6b	Later Subgroup Coordination Reciprocity	Team Performance	.31	.24

Note. Power = .80.

Procedure

Students were presented with a challenge: collaborate in cross-functional, multinational teams for 8 weeks in order to produce an innovative pro-environment smartphone application. Teams were tasked with the overarching goal of creating a smartphone application, with the general purpose of the application being to solve an environmental problem. At the functional sub-team level, ecology students' goal was to identify and comprehensively review an important, contemporary ecological problem. Psychology students' goal was to identify behavioral and attitude change strategies in order to realize actual change. Business students' goal was to synthesize the ecological and psychological information provided them, and to create a marketable, potentially profitable application.

During Phase I, students worked within their functional expertise areas, honing their specific expertise. Ecology and psychology students worked on identifying important an environmental problem and the dysfunctional human behaviors supporting this problem, respectively, during Phase I of the project. Meanwhile, the business teams researched smartphone application adoption. During Phase II, the 3 areas of functional expertise produced a single deliverable. The ecology teams researched databases to be included in the application, and the psychology teams specified what attitudes, behaviors, and cognitions the app needed to target. The business teams incorporated the other 2 teams' work into the first draft of the app proposal. Phase III involved each team receiving feedback and submitting as revised proposal. In order to successfully complete Phases II and III, students needed to engage in global team collaboration, synthesizing ideas from the 3 different functional areas. Teams collaborated virtually using

communication methods such as: WebEx software (Cisco Systems, Inc., 2011), email, telephone, instant messaging, and social media websites. Table 6 outlines the timeline of measurement administration that took place over the course of the project.

Table 6

Detailed Outline of Measurement Phases

Phase	Start Date	Goal Due Dates		Measurement Date	Duration	Measures
		Functional Expertise Group	Team			
0	1/23/12 to 1/25/12	n/a	n/a	1/23/12 to 1/25/12	0 days	Individual Difference Variables: Gender, Age, Narcissism, Psychological Collectivism
1	1/23/12 to 1/25/12	2/7/12 to 2/20/12	2/27/12	2/7/12 to 2/22/12	33-35 days	*
2	2/27/12	3/2/12	3/9/12	3/7/12 to 3/8/12	11 days	Sociometric Items: Trust, Communication
3	3/9/12	3/30/12	4/20/12	4/18/12 to 4/20/12	42 days	Sociometric Items: Trust, Communication

Note. Measurement dates varied depending on what class participants belonged to.

* Nothing relevant to the current study was measured at the phase 1 time point.

Survey Measures

The following survey-based measures were administered to all participants.

Attribute Variables

“What is your gender?” assessed gender. Response options were “Male,” “Female,” and “Other.” “What is your age?” assessed age, and response options ranging from 15 to 100 were provided. Ames, Rose, and Anderson’s (2006) forced-choice scale was used to assess narcissism. An example item is: “I really like to be the center of attention” versus “It makes me uncomfortable to be the center of attention.” Less narcissistic responses were given a score of “1” and more narcissistic responses were given a score of “2.” Psychological collectivism was assessed using Jackson, Colquitt, Wesson, and Zapata-Phelan’s (2006) 15-item measure. An example item is “I preferred to work in those groups rather than working alone.”

Faultline scores were calculated based on the procedure set forth by Thatcher, Jehn, and Zanutto (2003); Table 2 illustrates the different steps taken to calculate faultline strength in the form of a series of equations. Gender, age, and area of functional expertise (applied ecology, social science, or strategic management) were used to calculate social faultline scores, and narcissism, psychological collectivism, and area of functional expertise (applied ecology, social science, or strategic management) were used to calculate informational faultlines scores. Functional expertise was used to calculate both social and information faultlines because it can be conceptualized as both a social and informational characteristic of the group members.

Specifically, in order to calculate faultline scores, raw data was entered into an Excel spreadsheet, and standard deviations were calculated for all continuous variables.

Next, the data was rescaled; dividing each datum by the square root of 2 rescaled categorical variables, and dividing each datum by the overall variable's standard deviation rescaled continuous variables. Then, averages were computed for each rescaled variable, and difference scores—each individual rescaled score minus the average for the rescaled variable—and sums of squares were calculated for each rescaled variable. To calculate the total sums of square, the sums of squares across all variables were added up. Next, all possible combinations of subgroups were listed, not accounting for single-member subgroups. Average subgroup characteristics are calculated by averaging the rescaled scores for each variable for each subgroup. Then, grand mean of the rescaled data for each variable was subtracted from each average subgroup characteristic. This value was squared, and multiplied by the number of people in the subgroup, to control for group size. The between sums of squares was tabulated, and then added together for the total between sums of squares. Finally, the total between sums of squares for each combination of individuals was divided by the overall total sums of squares. This produced a faultline score for each combination, and the largest score is the overall faultline score for the group (Thatcher, Jehn, & Zanutto, 2003). This particular combination of individuals represents the situation in which the social/informational differences between individuals maximize the rift between subgroups in terms of trust/coordination. Faultline scores, similar to correlation coefficients, range from 0 to 1; however, faultline scores are always positive. A high faultline score indicates a clear rift between subgroups, while a low faultline score indicates the absence of a clear rift between subgroups.

Trust

A sociometric prompt, where each participant described every other member of the team, was used to gauge trust. “I have a trusting relationship with this person” was the statement used to assess trust. Participants could either indicate the veracity of the statement by checking a box, or could leave the box unchecked; these responses were coded as “1” and “0,” respectively.

Coordination

Sociometric prompts were also used to assess coordination. Coordination, in the form of communication, was measured by asking, “While you and your team were working to complete Goal #, who did you communicate with frequently?” Responses for this item were made in the form of participants ticking a box to indicate that they had communicated with an individual.

Team Performance

Subject matter experts were used to assess the quality of the final deliverables for all three functional expertise areas; specifically, the raters judged how impactful the students’ projects were, based on criteria specific to the students’ areas of expertise. Ecology teams’ performance was rated on a 1 to 5 scale in terms of the environmental utility of the proposals. Psychology teams’ performance was rated on a 1 to 4 scale in terms of the expected magnitude of behavior change. Business teams’ performance was similarly rated on a 1 to 4 scale in terms of the novelty of the proposal, with more novel proposal being of higher value. The final team system performance score was a multiplicative term of the three component functional expertise area performance scores. Possible functional scores for ecology ranged from 1 to 5; observed functional scores for

ecology ranged from .67 to 3.91. Possible functional scores for psychology ranged from 1 to 4; observed functional scores for psychology ranged from 2.25 to 4.00. Possible functional scores for business ranged from 1 to 4; observed functional scores for business ranged from 1.54 to 3.17. Multiplicative team performance scores could range from 1 to 80; observed scores in the current sample of teams ranged from 4.70 to 46.95.

Dyadic Processes

There are a variety of ways to gauge emergent states using network methodology. At the dyadic network level—or at the level of analysis involving pairs of individuals—one common index is reciprocity, which reflects the “prevalence of reciprocity in [the] network” (Hanneman & Riddle, 2005), or the frequency of symmetric relations. Theoretically, reciprocity indicates the level of stability of the overall network; “the degree of “reciprocity”...in relations can be regarded as important indicators of the stability and institutionalization (that is, the extent to which relations are taken for granted and are norm governed) of actor's positions in social networks” (Hanneman & Riddle, 2005). As illustrated in Figure 2, groups that have low levels of reciprocity have a high number of asymmetric relations, whereas groups that have high levels of reciprocity have a high number of symmetrical relations, regardless of the overall network density. In other words, reciprocity is “[t]he degree to which a relation is commonly perceived and agreed upon by all parties to the relation [i.e., the degree of symmetry]” (Tichy, Tushman, & Fombrun, 1979, p. 508); it is a situation with directed data where ties are symmetrical, or if A indicates a tie with B then B also indicates a tie with A. There are two common ways of calculating reciprocity: the dyad method and the

arc method. The dyad method involved calculating the proportion of dyads, or pairs of individuals, that have a reciprocated tie between them. The equation is as follows:

$$\frac{\text{\textit{\# of dyads with a reciprocated tie}}}{\text{\textit{\# of connected dyads}}}$$

Alternatively, the arc method looks at the number of ties involved in reciprocal relations relative to the total number of ties, or less commonly, relative to the total number of possible ties (Hanneman & Riddle, 2005). The current study used the dyad method for calculating reciprocity in UCINET (Network>Cohesion>Reciprocity; Borgatti, Everett, & Freeman, 2002). Sociograms are also commonly used to assess reciprocity (Scott, 1987), as exemplified in Figure 2.

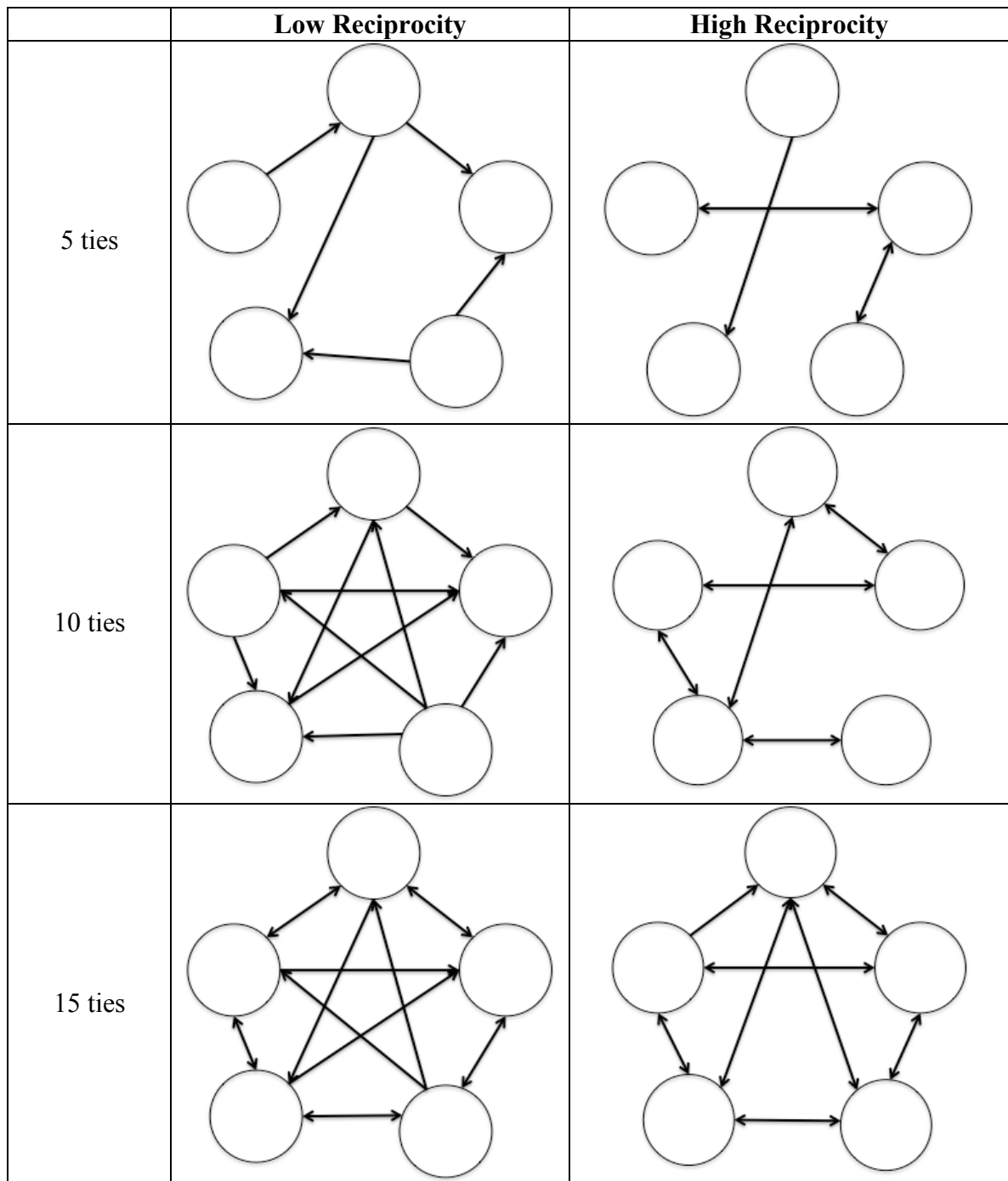


Figure 2. Visual depiction of high and low reciprocity teams exhibiting a small, moderate, and large number of ties (i.e., 5, 10, and 15 ties respectively).

Even in directed network ties tend towards reciprocity (Hoff, Raftery, & Handcock, 2002), and the case of human social networks is no exception; human networks tend to display high reciprocity, a unique exception being the Twitter social network, in which 77.9% of individuals are connected to one another via a unidirectional tie (i.e., individuals tend to “follow” people such as celebrities or public figures that do not “follow back”; Kwak, Lee, Park, & Moon, 2010). However, it should be noted that although this lack of reciprocity on Twitter is true for the phenomenon of following, reciprocated communications (i.e., tweets) are 2 to 3 times more prevalent than unreciprocated communications (Cheng, Romero, Meeder, & Kleinberg, 2011). Reciprocal ties between individuals can have positive connotations, such as reciprocal trust (Nguyen, Lim, Tan, Jiang, & Sun, 2010) and reciprocal coordination ties (Provan & Sebastian, 1998), and also, negative connotations, such as reciprocal dislike. Moreover, there are implications for unidirectional ties for a multitude of variables, such as trust (e.g., Gürsakal, Alkiş, Tüzüntürk, & Ünlü, 2008).

Table 7

Hypothesized Relationships and Model/Equation

Hypothesis Number	Hypothesis	Model/Equation	Coefficient Relevant to Hypothesis
1a	Social faultline strength (β_1) will positively predict subgroup trust reciprocity among members of the same subgroup.	<i>Trust Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$	β_1
1b	Social faultline strength (β_1) will positively predict subgroup coordination reciprocity among members of the same subgroup.	<i>Coordination Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$	β_1
2a	Informational faultline strength (β_1) will positively predict subgroup trust reciprocity among members of the same subgroup.	<i>Trust Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$	β_1
2b	Informational faultline strength (β_1) will positively predict subgroup coordination reciprocity among members of the same subgroup.	<i>Coordination Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$	β_1
3a	Social faultline strength will positively predict early subgroup trust reciprocity more strongly than will informational faultline strength.	Refer to coefficients from 1a and 2a.	
3b	Social faultline strength will positively predict early subgroup coordination reciprocity more strongly than will informational faultline strength.	Refer to coefficients from 1b and 2b.	
3c	Informational faultline strength will positively predict later subgroup trust reciprocity more strongly than will social faultline strength.	Refer to coefficients from 1a and 2a.	
3d	Informational faultline strength will positively predict later subgroup coordination reciprocity more strongly than will social faultline strength.	Refer to coefficients from 1b and 2b.	

Table 7 continued

Hypothesized Relationships and Model/Equation

Hypothesis Number	Hypothesis	Model/Equation	Coefficient Relevant to Hypothesis
4a	Subgroup trust reciprocity (β_1) will negatively predict team performance.	<i>Team Performance</i> $=\beta_0+\beta_1X_i+\varepsilon_i$	β_1
4b	Subgroup coordination reciprocity (β_1) will negatively predict team performance.	<i>Team Performance</i> $=\beta_0+\beta_1X_i+\varepsilon_i$	β_1
5a	Subgroup trust reciprocity (β_2) will mediate the relation between social faultline (β_1) strength and team performance.	<i>1. Team Performance</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>2. Trust Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>3. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$ <i>4. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$	1. β_1 2. β_1 3. β_2 4. β_1
5b	Subgroup coordination reciprocity (β_2) will mediate the relation between social faultline strength (β_1) and team performance.	<i>1. Team Performance</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>2. Trust Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>3. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$ <i>4. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$	1. β_1 2. β_1 3. β_2 4. β_1
6a	Subgroup trust reciprocity (β_2) will mediate the relation between informational faultline strength (β_1) and team performance.	<i>1. Team Performance</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>2. Trust Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>3. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$ <i>4. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$	1. β_1 2. β_1 3. β_2 4. β_1
6b	Subgroup coordination reciprocity (β_2) will mediate the relation between informational faultline strength (β_1) and team performance.	<i>1. Team Performance</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>2. Trust Reciprocity</i> $=\beta_0+\beta_1X_i+\varepsilon_i$ <i>3. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$ <i>4. Team Performance</i> $=\beta_0+\beta_1X_i+\beta_2X_i+\varepsilon_i$	1. β_1 2. β_1 3. β_2 4. β_1

CHAPTER 3

RESULTS

Before beginning hypothesis testing, I endeavored to test the assumptions of regression analysis, starting with that of the normal distribution.

Distributional Normality

First, all variables were checked to ensure that the observed distributions are reasonably normal. A visual analysis of a histogram—or frequency distribution—was carried out for each variable, the results of which can be seen in Figures 1 through 13. Next, a visual analysis of the Q-Q plot for each variable was performed. Q-Q-plots graphically depict whether 2 datasets share a common distribution by comparing quantiles of an observed distribution with quantiles of a standardized theoretical distribution (e.g., Kratz & Resnick, 1996). In this case, they depict the relation between the observed data and the expected normal distribution. These plots can be found in Figures 14 through 24. Based on a visual examination of the histograms and Q-Q plots, all the variables appeared to be relatively normally distributed, with the exception of: 1) informational faultline strength; 2) average weighted early subgroup trust reciprocity for networks partitioned based on social faultline strength; 3) average weighted early subgroup coordination reciprocity for networks partitioned based on social faultline strength; 4) average weighted later subgroup trust reciprocity for networks partitioned based on social faultline strength; 5) average weighted later subgroup trust reciprocity for networks partitioned based on informational faultline strength; and 6) team performance.

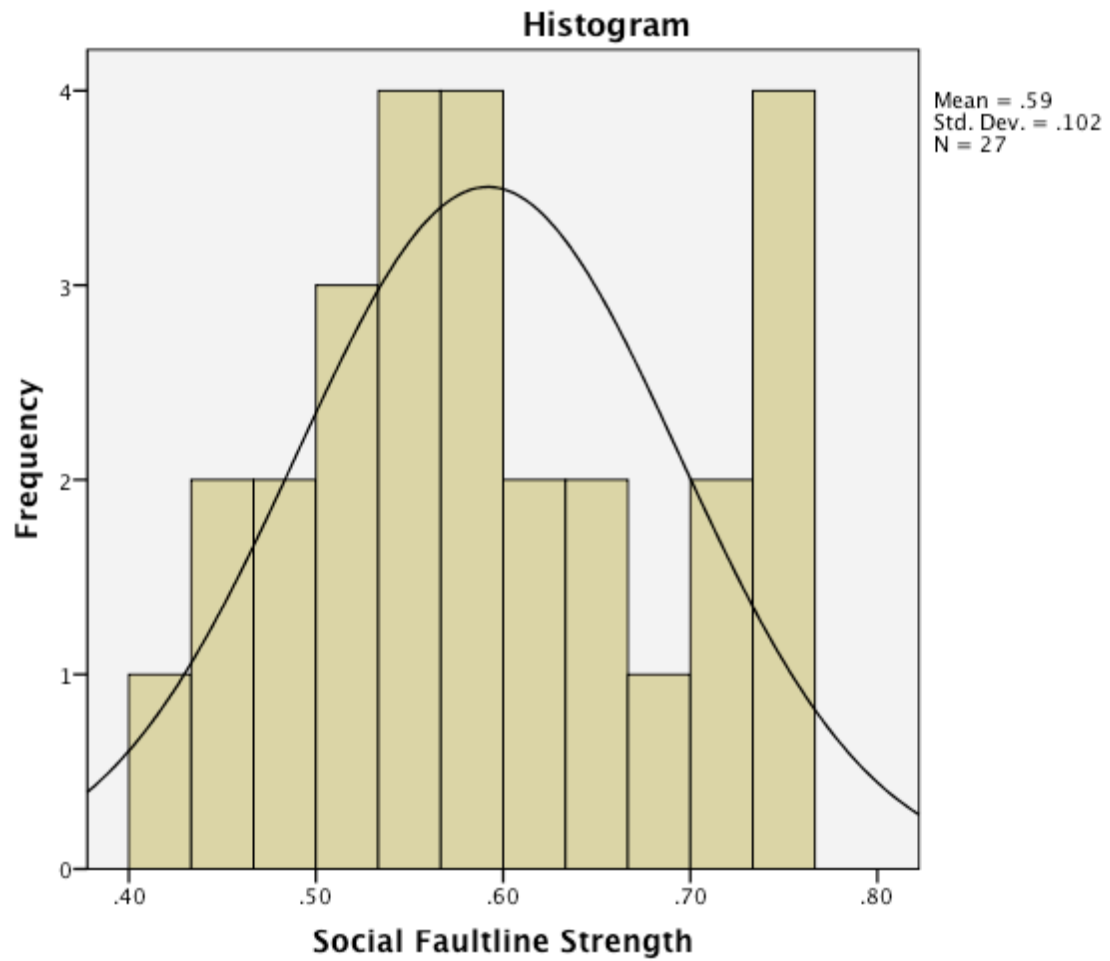


Figure 3. Frequency distribution of social faultline strength scores. ($N=27$)

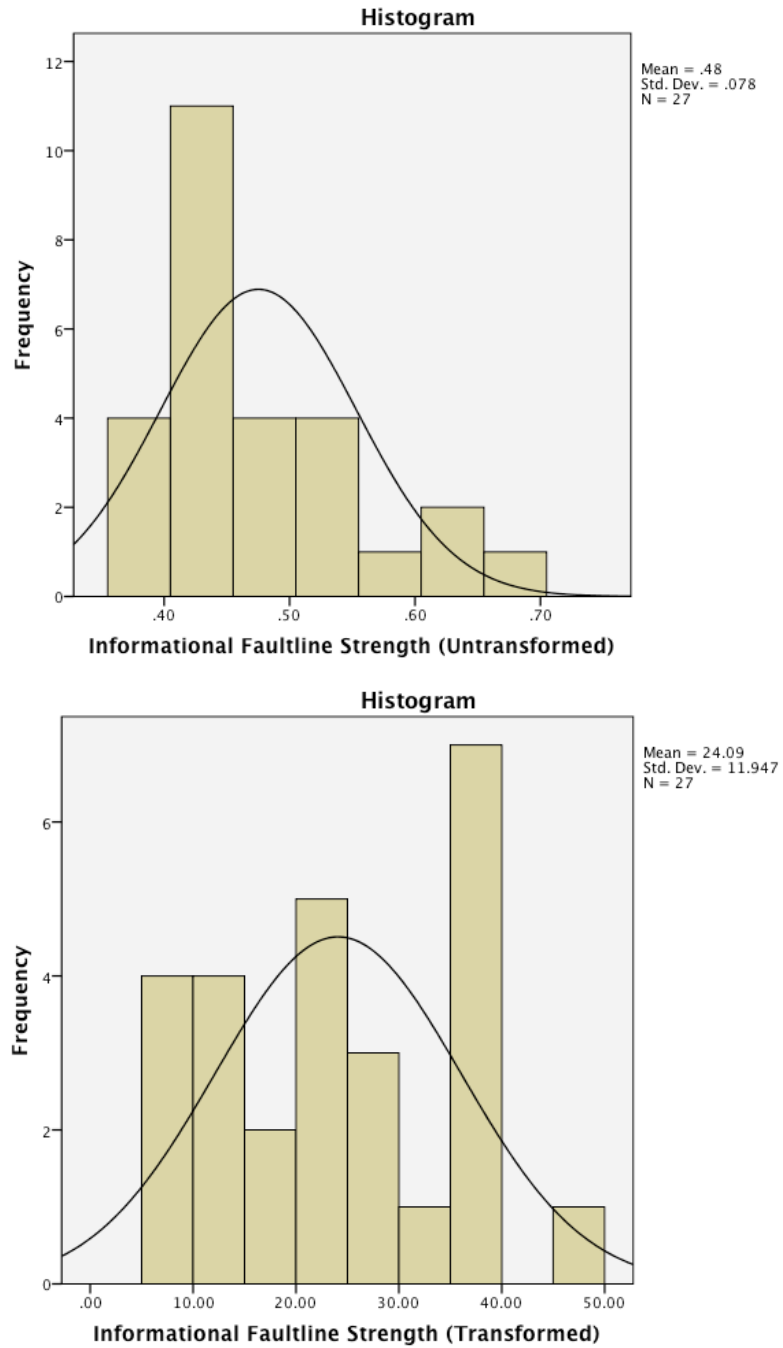


Figure 4. Frequency distributions of informational faultline strength scores. The top histogram represents the untransformed variable, and the bottom histogram represents the transformed variable. ($N=27$)

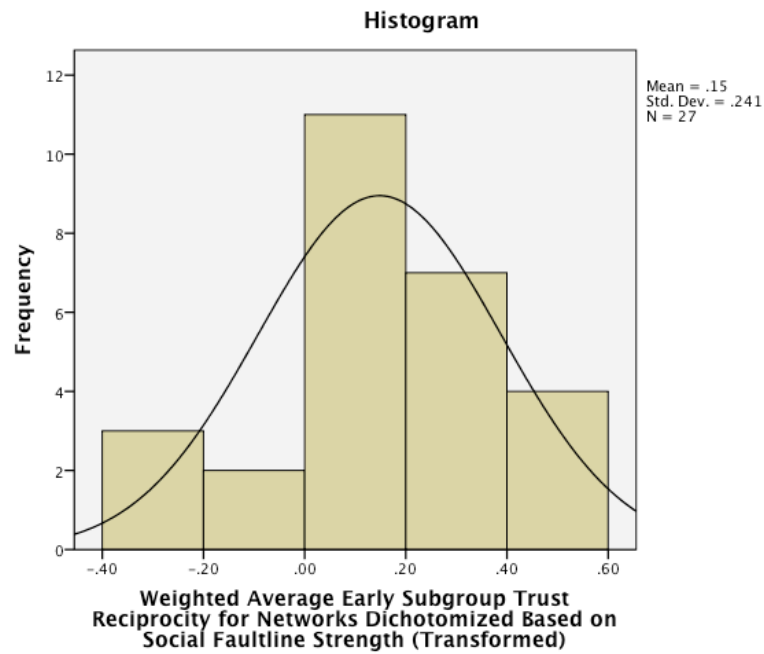
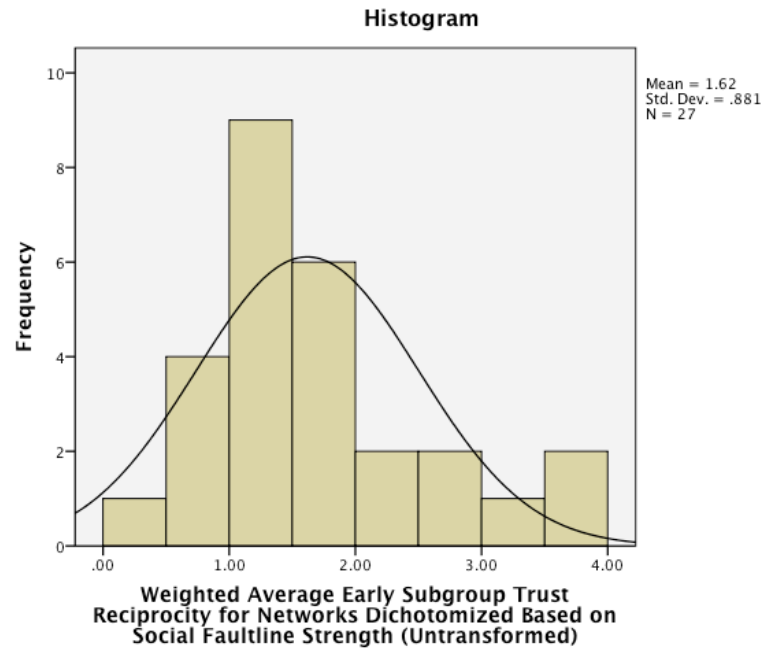


Figure 5. Frequency distributions of weighted average early subgroup trust reciprocity scores for networks dichotomized based on social faultline strength. The top histogram represents the untransformed variable, and the bottom histogram represents the transformed variable. ($N=27$)

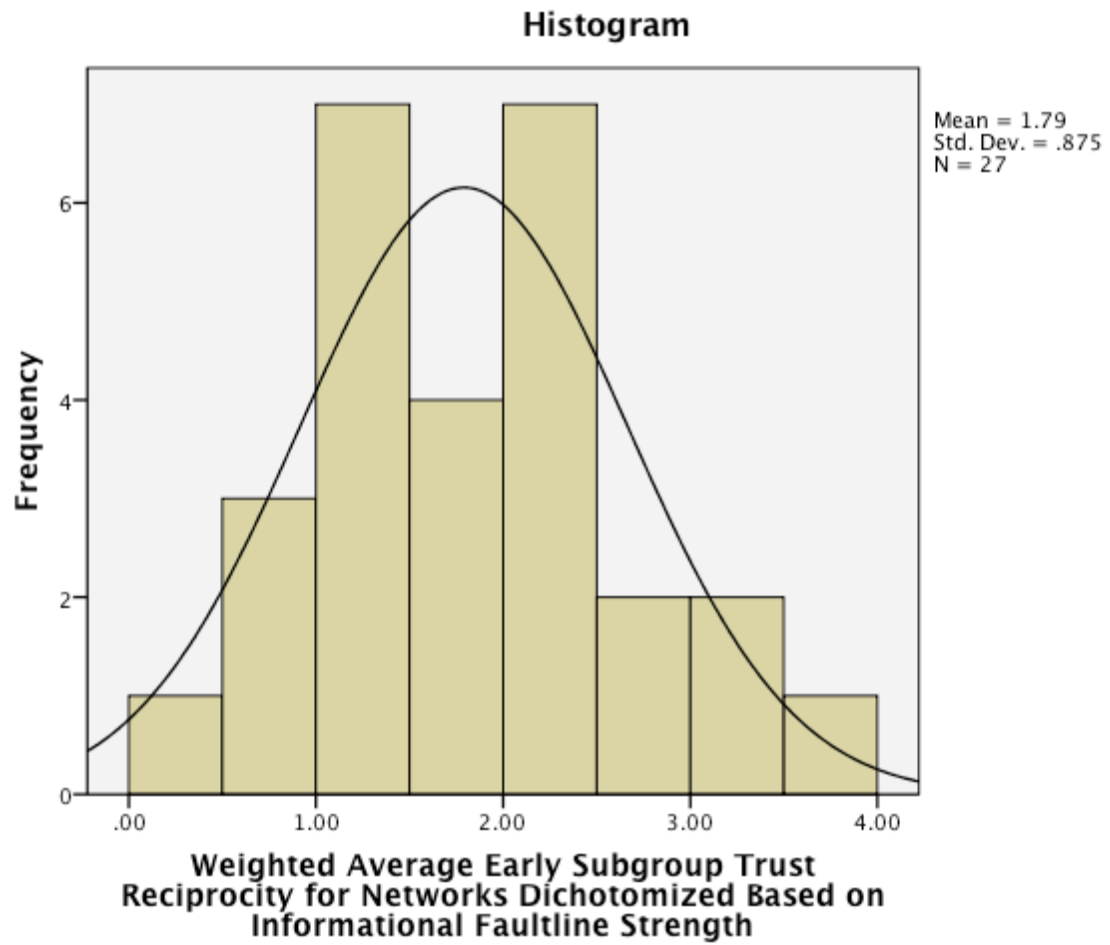


Figure 6. Frequency distribution of weighted average early subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

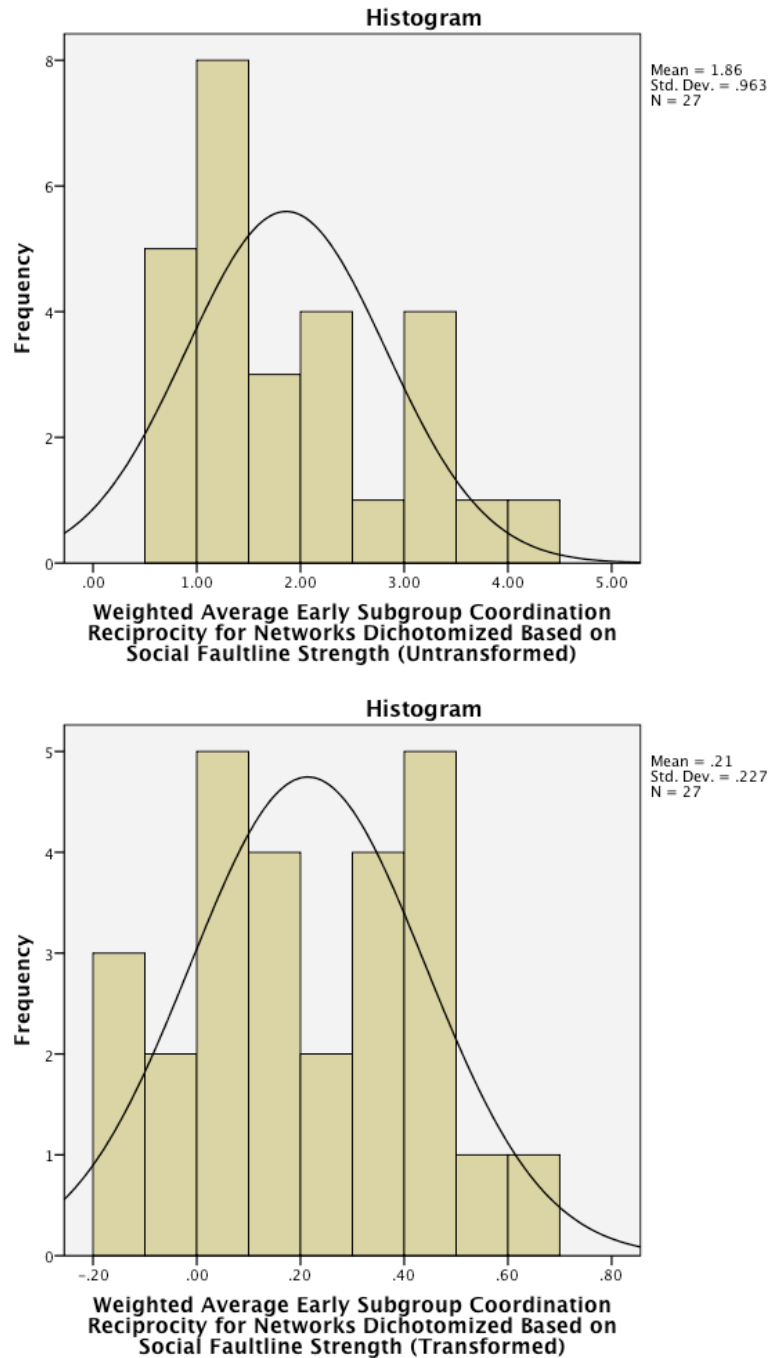


Figure 7. Frequency distributions of weighted average early subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength. The top histogram represents the untransformed variable, and the bottom histogram represents the transformed variable. ($N=27$)

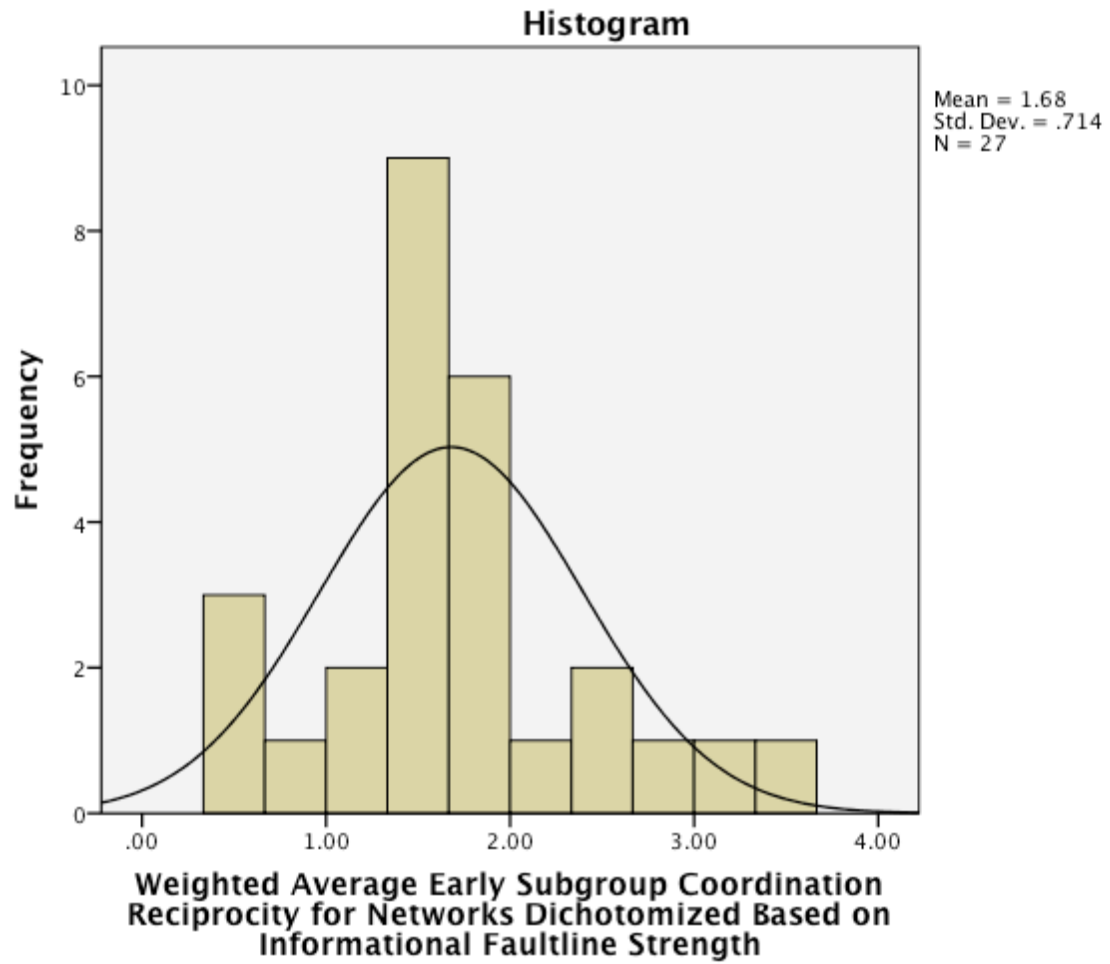


Figure 8. Frequency distribution of weighted average early subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength. (N=27)

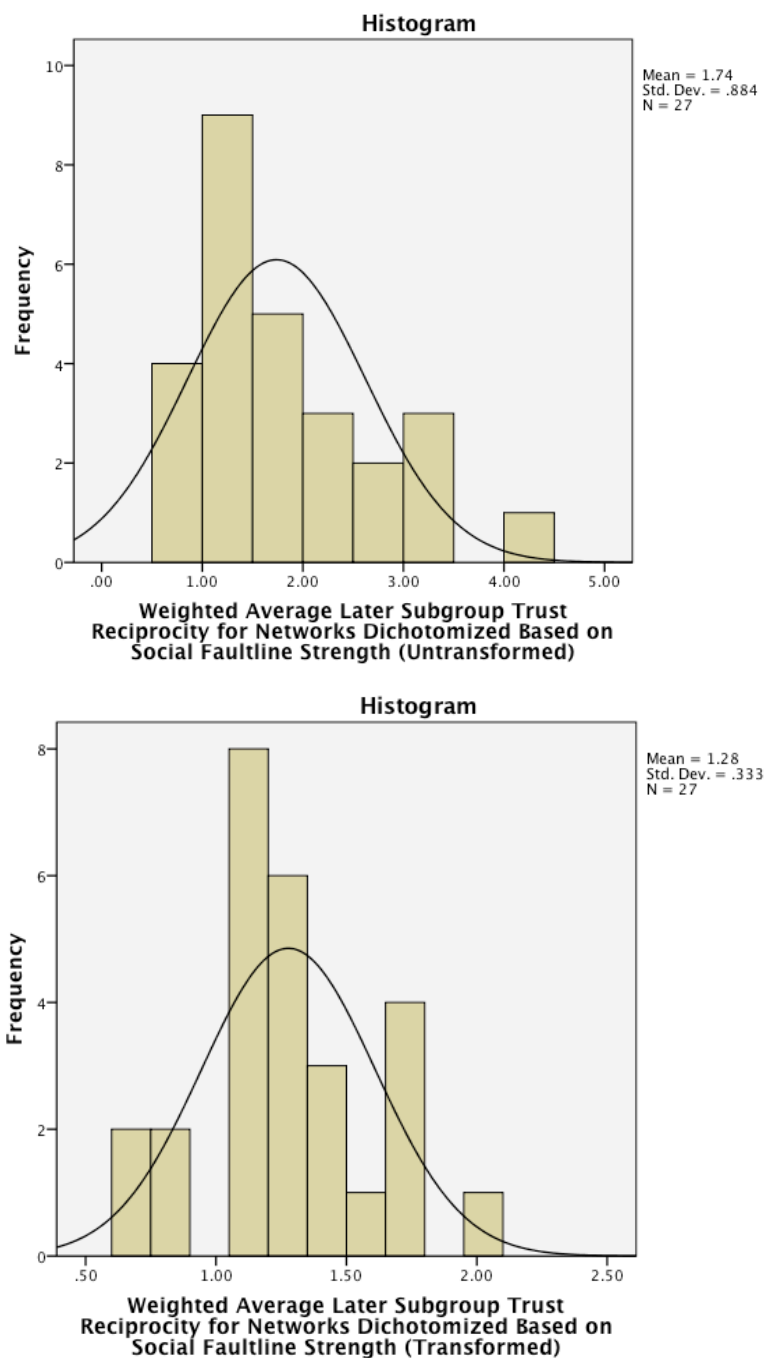


Figure 9. Frequency distributions of weighted average later subgroup trust reciprocity scores for networks dichotomized based on social faultline strength. The top histogram represents the untransformed variable, and the bottom histogram represents the transformed variable. ($N=27$)

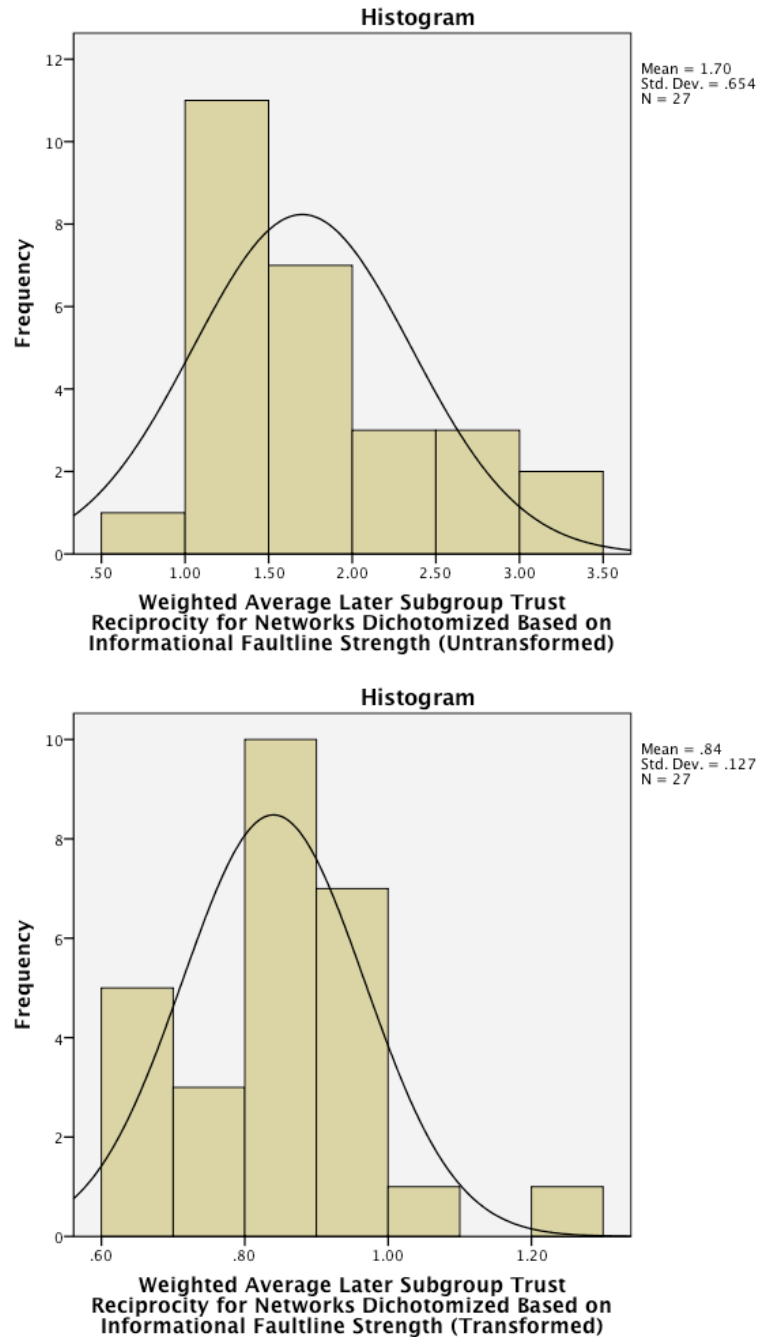


Figure 10. Frequency distributions of weighted average later subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength. The top histogram represents the untransformed variable, and the bottom histogram represents the transformed variable. ($N=27$)

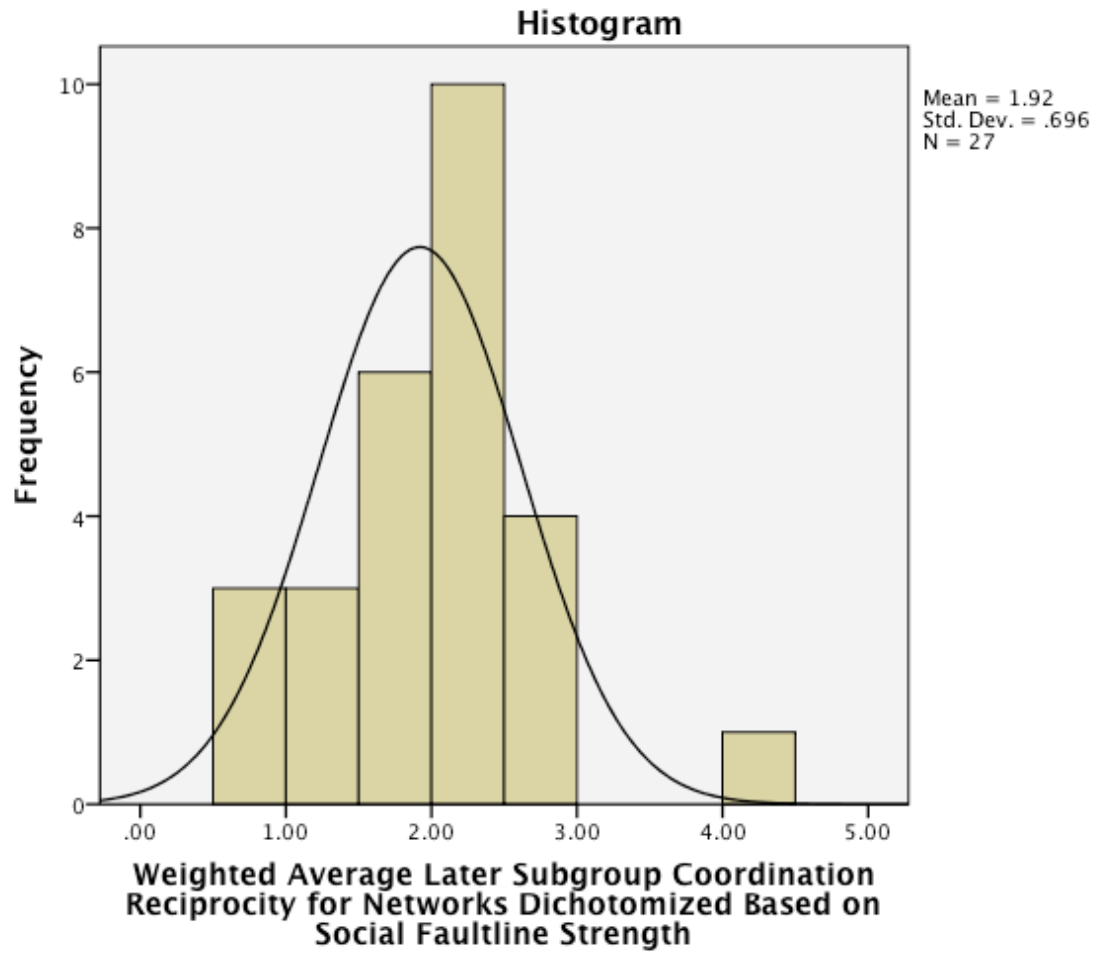


Figure 11. Frequency distribution of weighted average later subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength. ($N=27$)

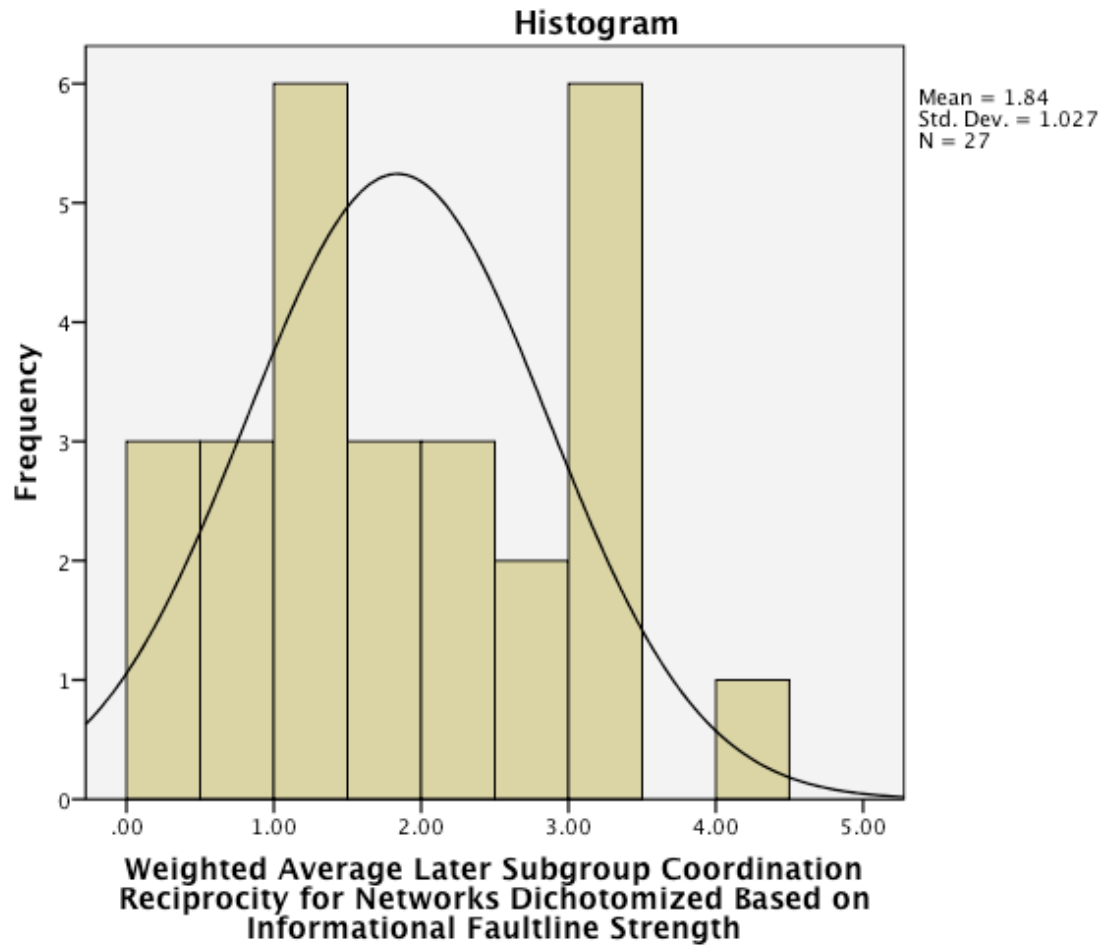


Figure 12. Frequency distribution of weighted average later subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength. (N=27)

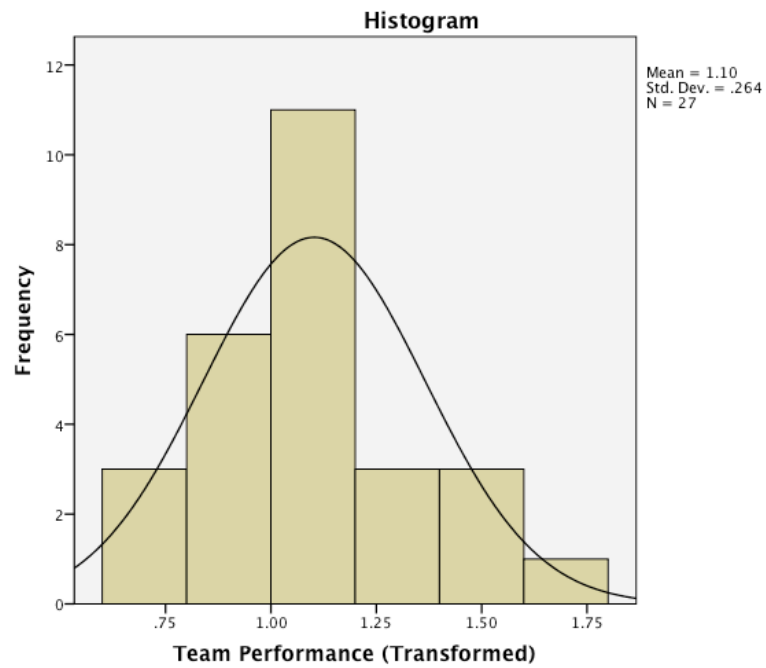
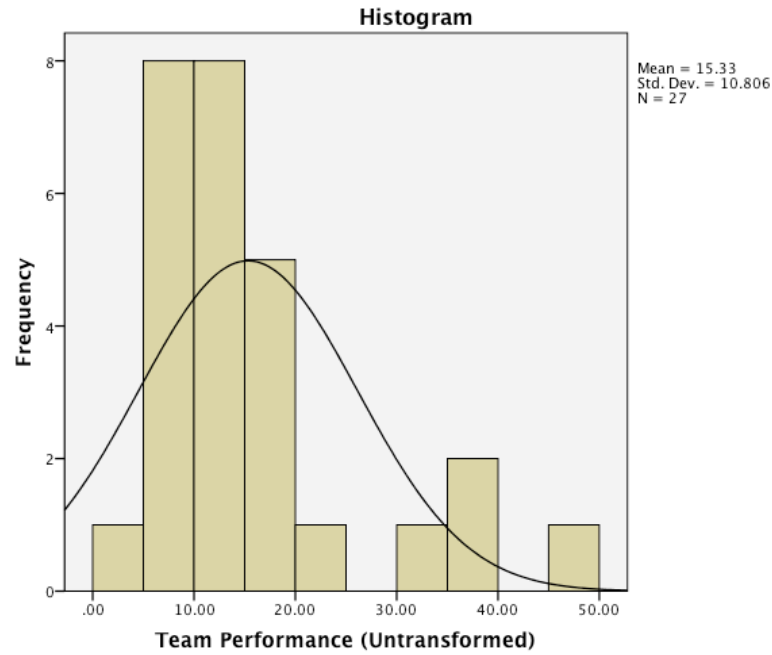


Figure 13. Frequency distributions of team performance scores. The top histogram represents the untransformed variable, and the bottom histogram represents the transformed variable. ($N=27$)

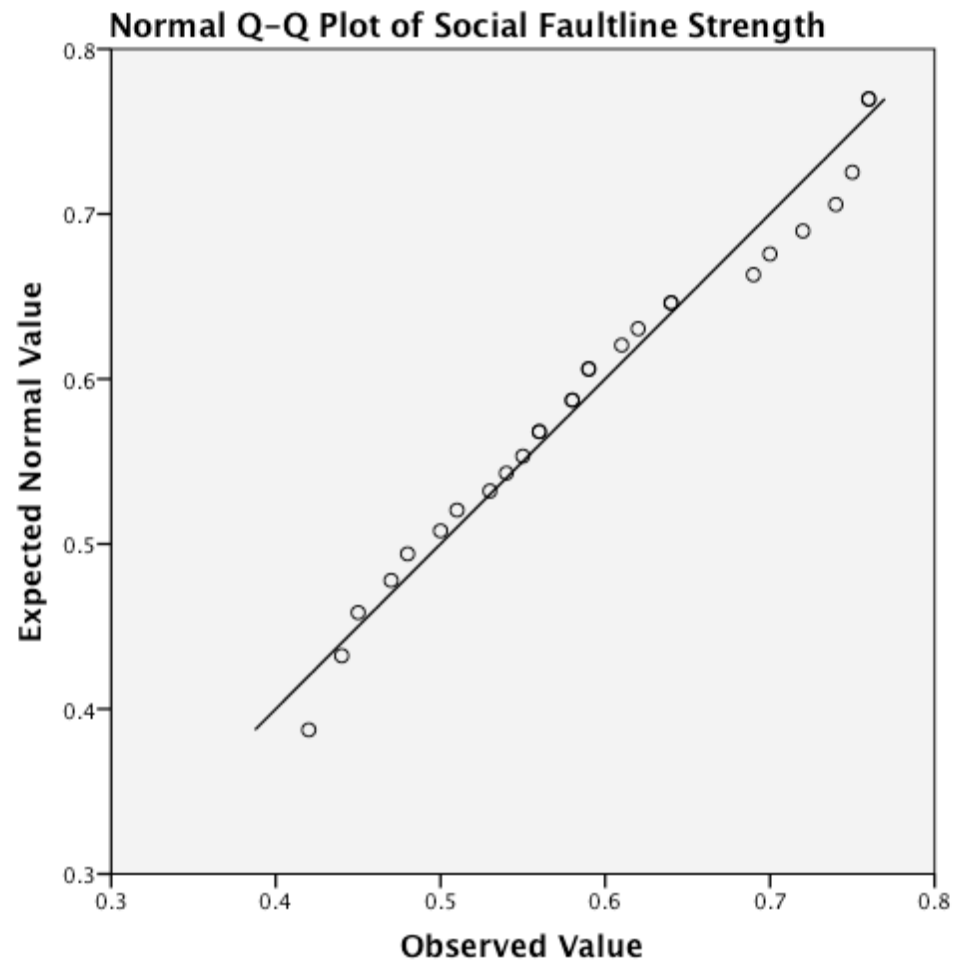
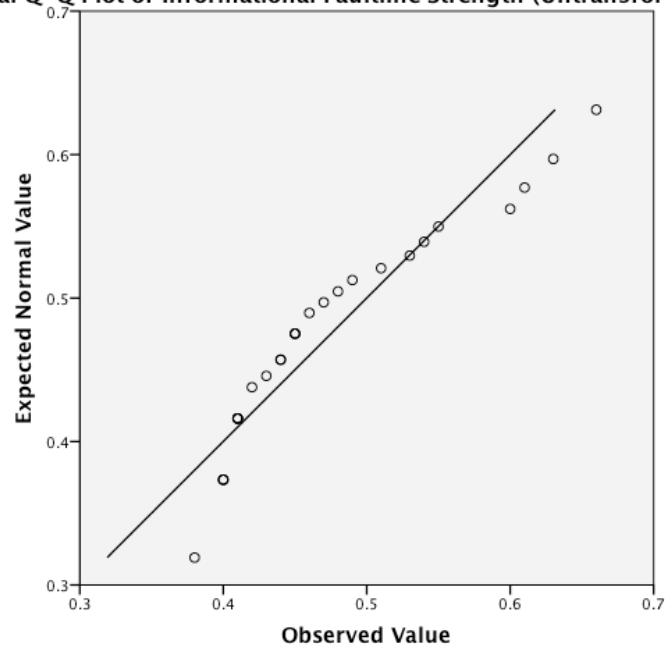


Figure 14. Q-Q plot of social faultline strength scores. ($N=27$)

Normal Q-Q Plot of Informational Faultline Strength (Untransformed)



Normal Q-Q Plot of Informational Faultline Strength (Transformed)

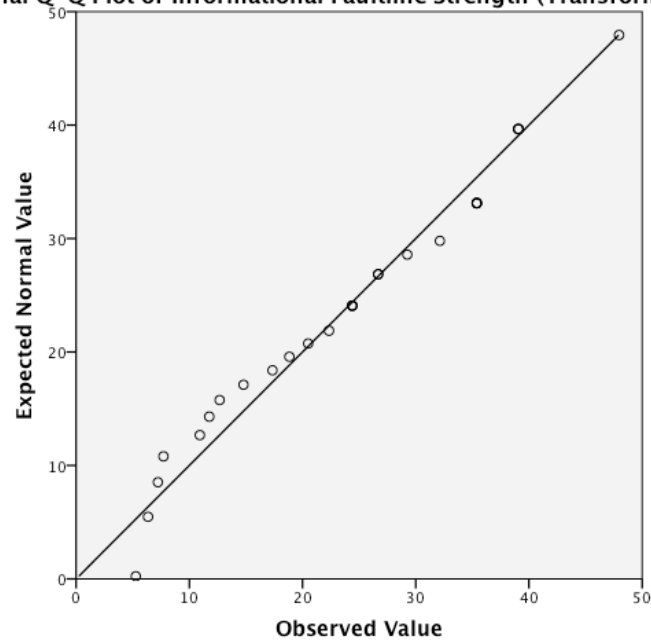
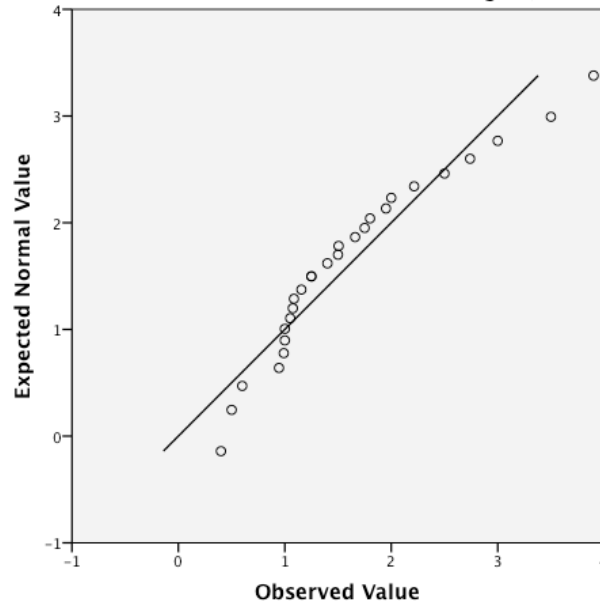


Figure 15. Q-Q plots of informational faultline strength scores. The top Q-Q plot represents the untransformed variable, and the bottom Q-Q plot represents the transformed variable. ($N=27$)

Normal Q-Q Plot of Weighted Average Early Subgroup Trust Reciprocity for Networks Dichotomized Based on Social Faultline Strength (Untransformed)



Normal Q-Q Plot of Weighted Average Early Subgroup Trust Reciprocity for Networks Dichotomized Based on Social Faultline Strength (Transformed)

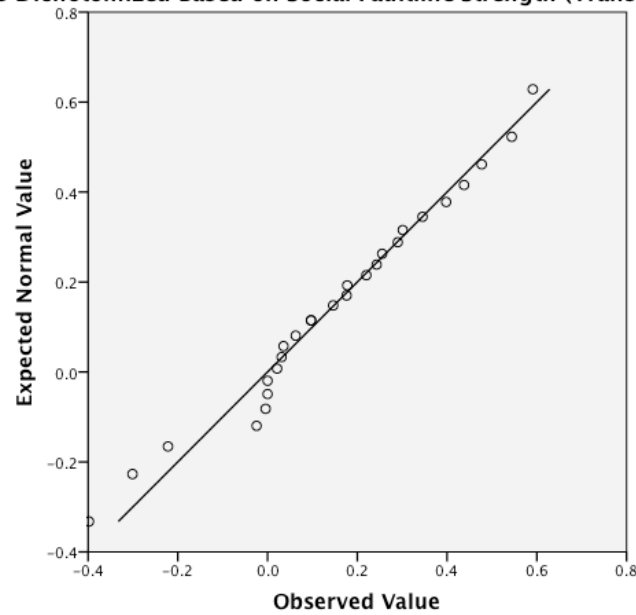


Figure 16. Q-Q plots of weighted average early subgroup trust reciprocity scores for networks dichotomized based on social faultline strength. The top Q-Q plot represents the untransformed variable, and the bottom Q-Q plot represents the transformed variable. (N=27)

Normal Q-Q Plot of Weighted Average Early Subgroup Trust Reciprocity for Networks Dichotomized Based on Informational Faultline Strength

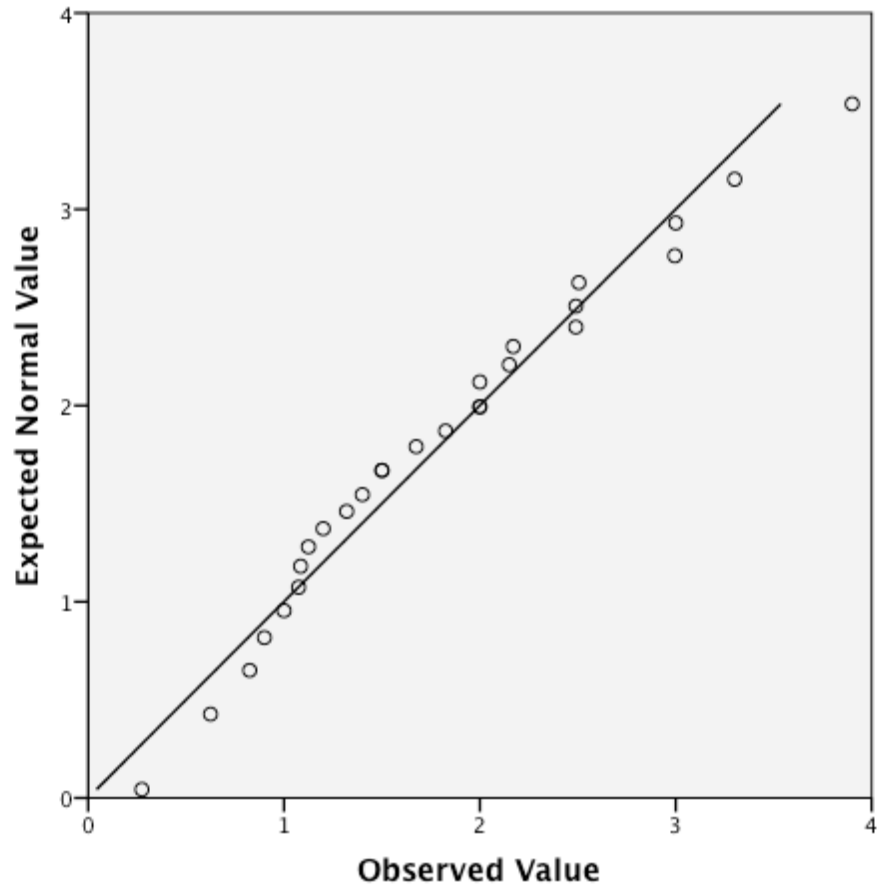
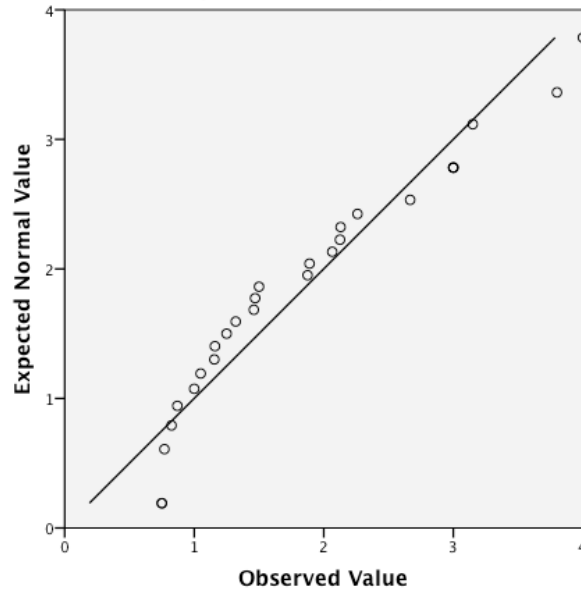


Figure 17. Q-Q plot of weighted average early subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

Normal Q-Q Plot of Weighted Average Early Subgroup Coordination Reciprocity for Networks Dichotomized Based on Social Faultline Strength (Untransformed)



Normal Q-Q Plot of Weighted Average Early Subgroup Coordination Reciprocity for Networks Dichotomized Based on Social Faultline Strength (Transformed)

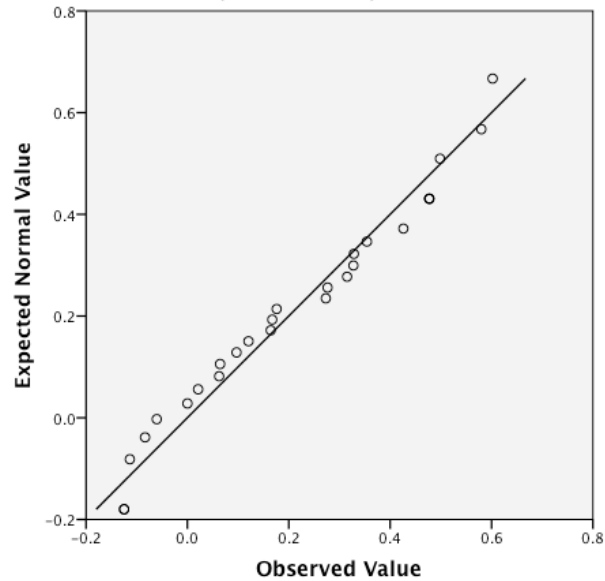


Figure 18. Q-Q plots of weighted average early subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength. The top Q-Q plot represents the untransformed variable, and the bottom Q-Q plot represents the transformed variable. ($N=27$)

Normal Q-Q Plot of Weighted Average Early Subgroup Coordination Reciprocity for Networks Dichotomized Based on Informational Faultline Strength

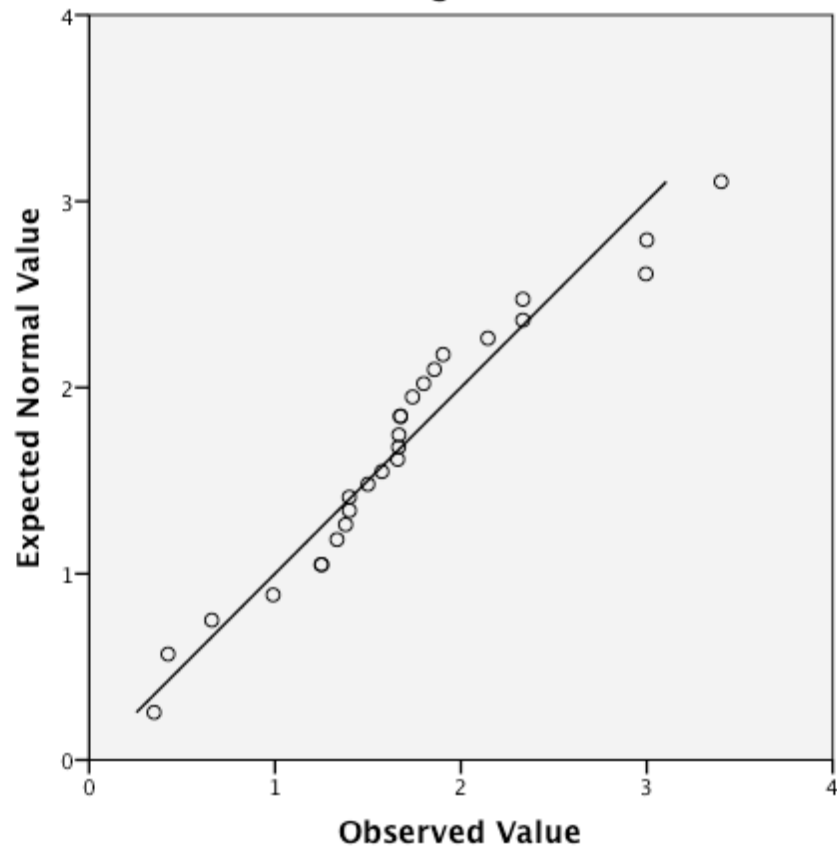
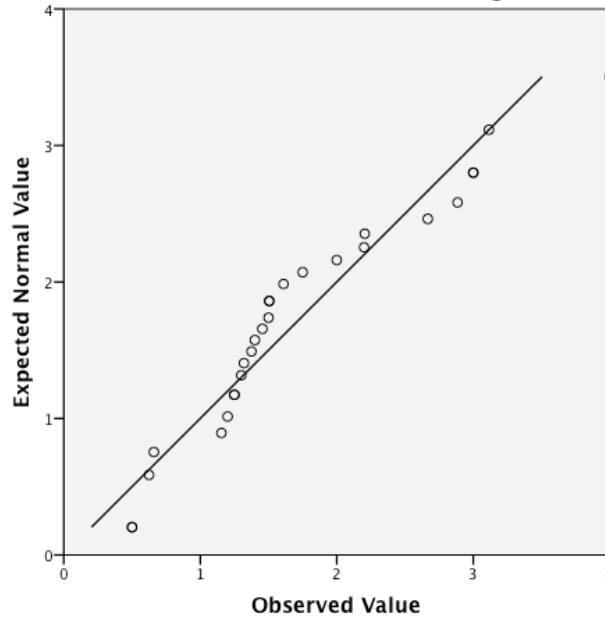


Figure 19. Q-Q plot of weighted average early subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

Normal Q-Q Plot of Weighted Average Later Subgroup Trust Reciprocity for Networks Dichotomized Based on Social Faultline Strength (Untransformed)



Normal Q-Q Plot of Weighted Average Later Subgroup Trust Reciprocity for Networks Dichotomized Based on Social Faultline Strength (Transformed)

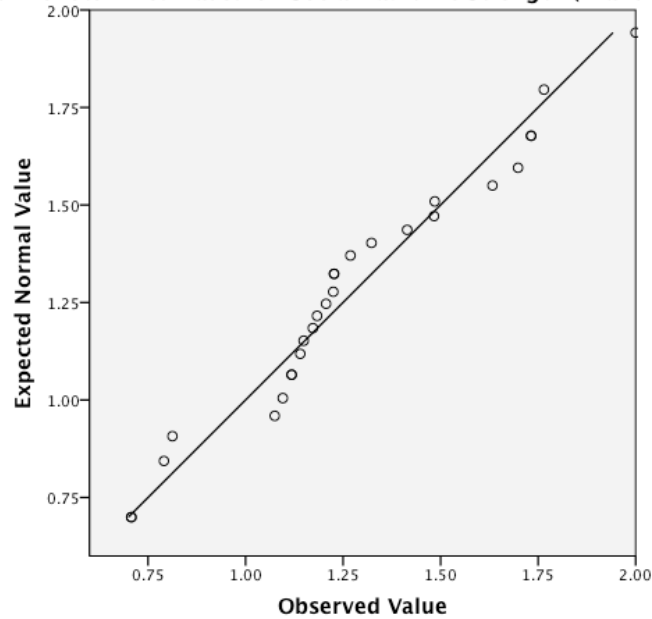
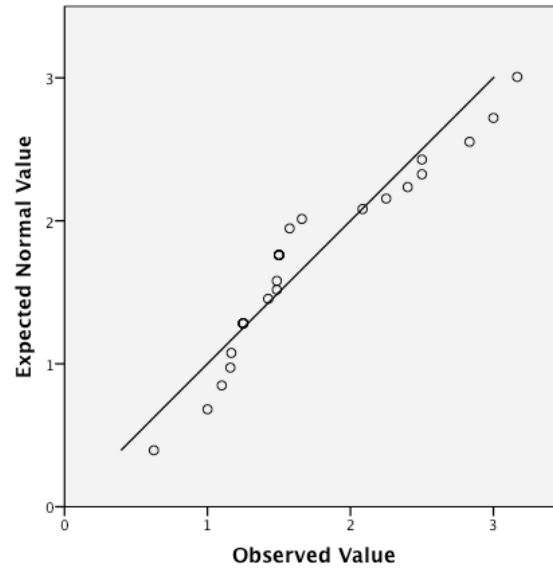


Figure 20. Q-Q plots of weighted average later subgroup trust reciprocity scores for networks dichotomized based on social faultline strength. The top Q-Q plot represents the untransformed variable, and the bottom Q-Q plot represents the transformed variable. (N=27)

Normal Q-Q Plot of Weighted Average Later Subgroup Trust Reciprocity for Networks Dichotomized Based on Informational Faultline Strength (Untransformed)



Normal Q-Q Plot of Weighted Average Later Subgroup Trust Reciprocity for Networks Dichotomized Based on Informational Faultline Strength (Transformed)

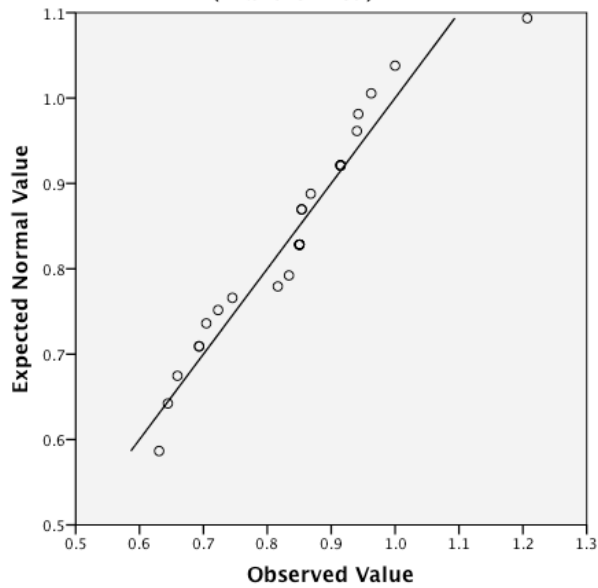


Figure 21. Q-Q plots of weighted average later subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength. The top Q-Q plot represents the untransformed variable, and the bottom Q-Q plot represents the transformed variable. ($N=27$)

Normal Q-Q Plot of Weighted Average Later Subgroup Coordination Reciprocity for Networks Dichotomized Based on Social Faultline Strength

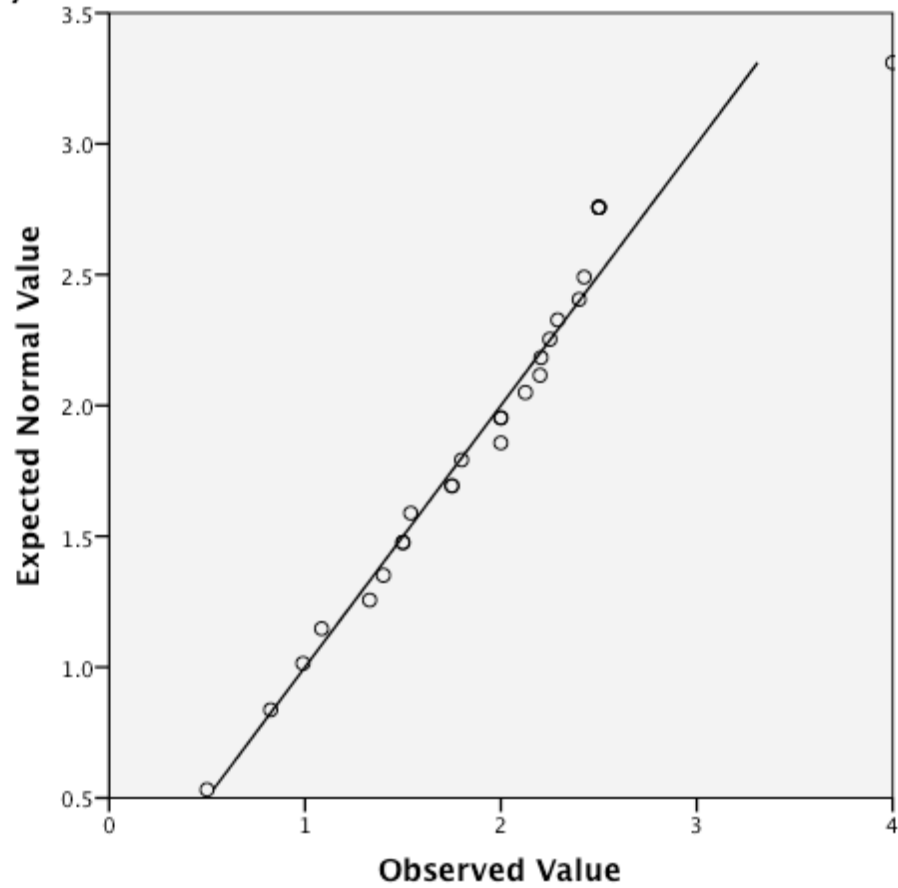


Figure 22. Q-Q plot of weighted average later subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength. ($N=27$)

Normal Q-Q Plot of Weighted Average Later Subgroup Coordination Reciprocity for Networks Dichotomized Based on Informational Faultline Strength

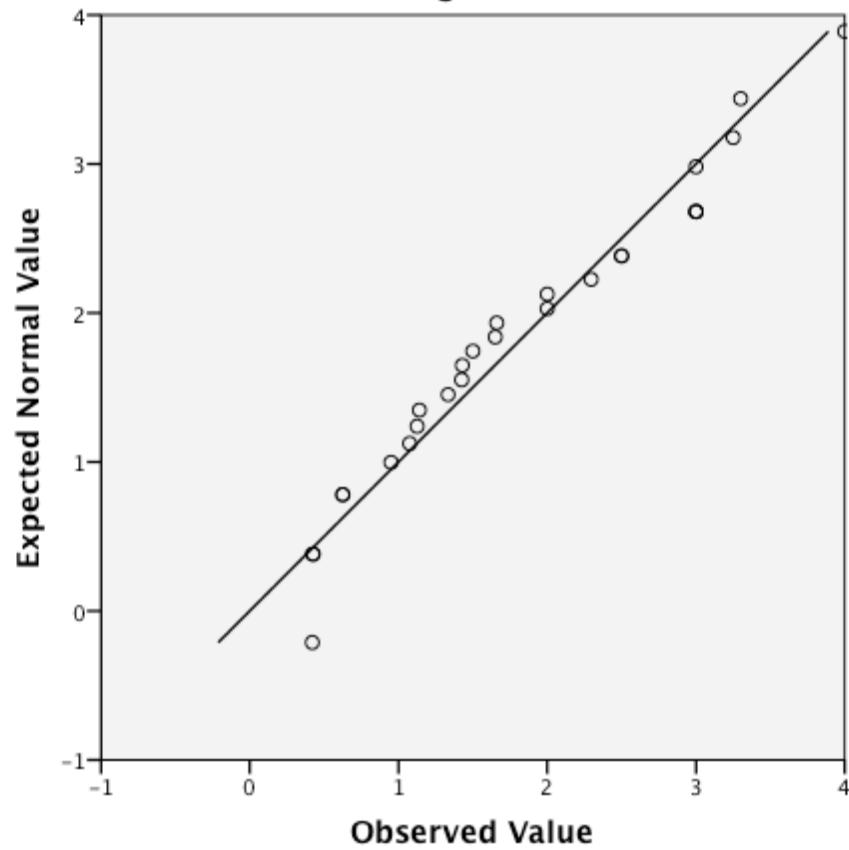


Figure 23. Q-Q plot of weighted average later subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

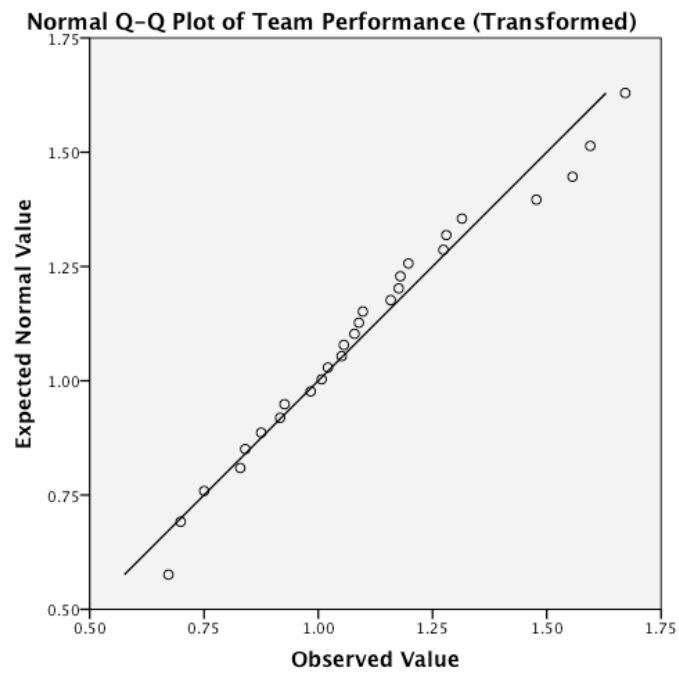
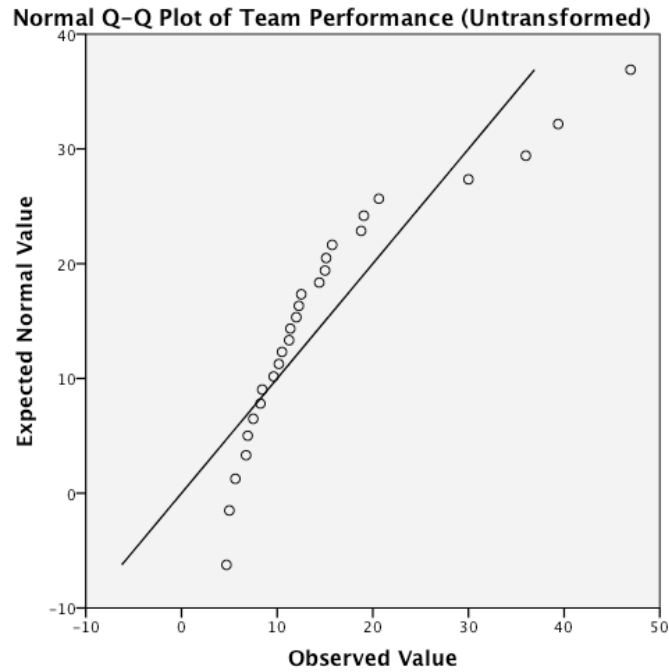


Figure 24. Q-Q plots of team performance scores. The top Q-Q plot represents the untransformed variable, and the bottom Q-Q plot represents the transformed variable. (N=27)

Due to the aforementioned observed departure from normality, Kolmogorov-Smirnov and Shapiro-Wilk tests were performed to verify each distribution's normality (or lack thereof). The Kolmogorov-Smirnov test can be used as a goodness of fit test (e.g., Massey, 1951; Lilliefors, 1967). In the case of testing for normality, samples are standardized and compared with a standard normal distribution. The Kolmogorov-Smirnov test is more general but less powerful than the Shapiro-Wilk test (Shapiro & Wilk, 1965; Shapiro & Francia, 1972). In both cases, a statistic that is not statistically significant indicates that the distribution for that variable is relatively normal, whereas a statistic that is statistically significant indicates that the distribution for that variable is not normal. The resulting statistics, which can be found in Tables 8 through 10, provided confirmatory evidence for the non-normality of the same variables that were identified as such via the previous visual analysis of histograms and Q-Q plots.

Table 8

Kolmogorov-Smirnov and Shapiro-Wilk Tests of Normality for Social Faultline Strength and Other Related Variables (N=27)

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	p value	Statistic	df	p value
Social Faultline Strength	.10	27	.20	.96	27	.29
Average Weighted Early Subgroup Trust Reciprocity	.14	27	.16	.91	27	.03
Average Weighted Early Subgroup Trust Reciprocity [†]	.13	27	.20	.98	27	.74
Average Weighted Early Subgroup Coordination Reciprocity	.17	27	.06	.91	27	.02
Average Weighted Early Subgroup Coordination Reciprocity [†]	.10	27	.20	.95	27	.20
Average Weighted Later Subgroup Trust Reciprocity	.20	27	.01	.92	27	.04
Average Weighted Later Subgroup Trust Reciprocity [†]	.15	27	.11	.95	27	.25
Average Weighted Later Subgroup Coordination Reciprocity	.17	27	.06	.94	27	.11

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 9

Kolmogorov-Smirnov and Shapiro-Wilk Tests of Normality for Informational Faultline Strength and Other Related Variables (N=27)

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	p value	Statistic	df	p value
Informational Faultline Strength	.18	27	.02	.88	27	.01
Informational Faultline Strength [†]	.12	27	.20	.96	27	.32
Average Weighted Early Subgroup Trust Reciprocity	.11	27	.20	.97	27	.60
Average Weighted Early Subgroup Coordination Reciprocity	.16	27	.10	.94	27	.15
Average Weighted Later Subgroup Trust Reciprocity	.25	27	.00	.89	27	.01
Average Weighted Later Subgroup Trust Reciprocity [†]	.16	27	.07	.93	27	.07
Average Weighted Later Subgroup Coordination Reciprocity	.13	27	.20	.94	27	.15

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 10

Kolmogorov-Smirnov and Shapiro-Wilk Tests of Normality for Team Performance (N=27)

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	p value	Statistic	df	p value
Team Performance	.23	27	.00	.80	27	.00
Team Performance [†]	.10	27	.20	.96	27	.46

Note. [†]Transformed variable. Sample size reflects the total number of teams.

Finally, the skewness and kurtosis of each distribution were assessed. Skewness is a measure of the extent to which a distribution is symmetrical or asymmetrical, and kurtosis is a measure of how peaked or flat a distribution is. For both skewness and kurtosis, values ranging from about -2 to 2 are acceptable in terms of normality (Muthén & Kaplan, 1985), with 0 indicating a totally normal distribution. The skewness and kurtosis statistics for the current dataset can be found in Tables 11 through 13. All values for skewness and kurtosis centered around the acceptable parameters for normality.

Table 11

Skewness and Kurtosis Statistics for Social Faultline Strength and Other Related Variables (N=27)

Variable	Skewness		Kurtosis	
	Statistic	SE	Statistic	SE
Social Faultline Strength	.19	.45	-.94	.87
Average Weighted Early Subgroup Trust Reciprocity	1.06	.45	.75	.87
Average Weighted Early Subgroup Trust Reciprocity [†]	-.25	.45	.08	.87
Average Weighted Early Subgroup Coordination Reciprocity	.73	.45	-.47	.87
Average Weighted Early Subgroup Coordination Reciprocity [†]	.05	.45	-1.18	.87
Average Weighted Later Subgroup Trust Reciprocity	.81	.45	.22	.87
Average Weighted Later Subgroup Trust Reciprocity [†]	.23	.45	-.28	.87
Average Weighted Later Subgroup Coordination Reciprocity	.49	.45	2.06	.87

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 12

Skewness and Kurtosis Statistics for Informational Faultline Strength and Other Related Variables (N=27)

Variable	Skewness		Kurtosis	
	Statistic	SE	Statistic	SE
Informational Faultline Strength	1.02	.45	.05	.87
Informational Faultline Strength [†]	.04	.45	-.99	.87
Average Weighted Early Subgroup Trust Reciprocity	.56	.45	-.07	.87
Average Weighted Early Subgroup Coordination Reciprocity	.50	.45	.77	.87
Average Weighted Later Subgroup Trust Reciprocity	.86	.45	-.11	.87
Average Weighted Later Subgroup Trust Reciprocity [†]	.51	.45	1.34	.87
Average Weighted Later Subgroup Coordination Reciprocity	.33	.45	-.94	.87

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 13

Skewness and Kurtosis Statistics for Informational Faultline Strength and Other Related Variables (N=27)

Variable	Skewness		Kurtosis	
	Statistic	SE	Statistic	SE
Team Performance	1.70	.45	2.37	.87
Team Performance [†]	.49	.45	-.17	.87

Note. [†]Transformed variable. Sample size reflects the total number of teams.

Resulting Transformations

Based on analyzing the histograms and the Kolmogorov-Smirnov and Shapiro-Wilk statistics, 6 variables were identified as being non-normally distributed: 1) informational faultline strength; 2) average weighted early subgroup trust reciprocity for networks partitioned based on social faultline strength; 3) average weighted early subgroup coordination reciprocity for networks partitioned based on social faultline strength; 4) average weighted later subgroup trust reciprocity for networks partitioned based on social faultline strength; 5) average weighted later subgroup trust reciprocity for networks partitioned based on informational faultline strength; and 6) team performance. These variables were transformed in order to normalize their distributions; these transformations are outlined in Table 14. Histograms and Q-Q plots for transformed variables are also displayed in Figures 4, 5, 7, 9, 10, 13, 15, 16, 18, 20, 21, and 24, and Kolmogorov-Smirnov and Shapiro-Wilk test statistics for transformed variables are included in Tables 8 through 13. Transformed versions of these variables were included in all subsequent analyses.

Table 14

Outline of Transformations Carried Out on Non-Normal Variables

Variable	Transformation
Informational Faultline Strength	$(variable)^{-4}$
Average Weighted Early Subgroup Trust Reciprocity <i>Network Partitioned Based on Social Faultline Strength</i>	$\log_{10}(variable)$
Average Weighted Early Subgroup Coordination Reciprocity <i>Network Partitioned Based on Social Faultline Strength</i>	$\log_{10}(variable)$
Average Weighted Later Subgroup Trust Reciprocity <i>Network Partitioned Based on Social Faultline Strength</i>	$\sqrt{(variable)}$
Average Weighted Later Subgroup Trust Reciprocity <i>Network Partitioned Based on Informational Faultline Strength</i>	$(variable)^{-4}$
Team Performance	$\log_{10}(variable)$

Outlier Analyses

The next diagnostic test that was performed was an outlier analysis. Outliers are observations where the dependent variable value is conditionally unusual given the value of the independent variable (Fox, 1997). This regression-based definition of outliers was incorporated into the analyses by looking at scatterplot matrices for each predicted relation, as seen in Figures 25 through 42. Using the transformed variables, none of the subsequent scatterplots produced using the current dataset indicated the presence of extreme outliers.

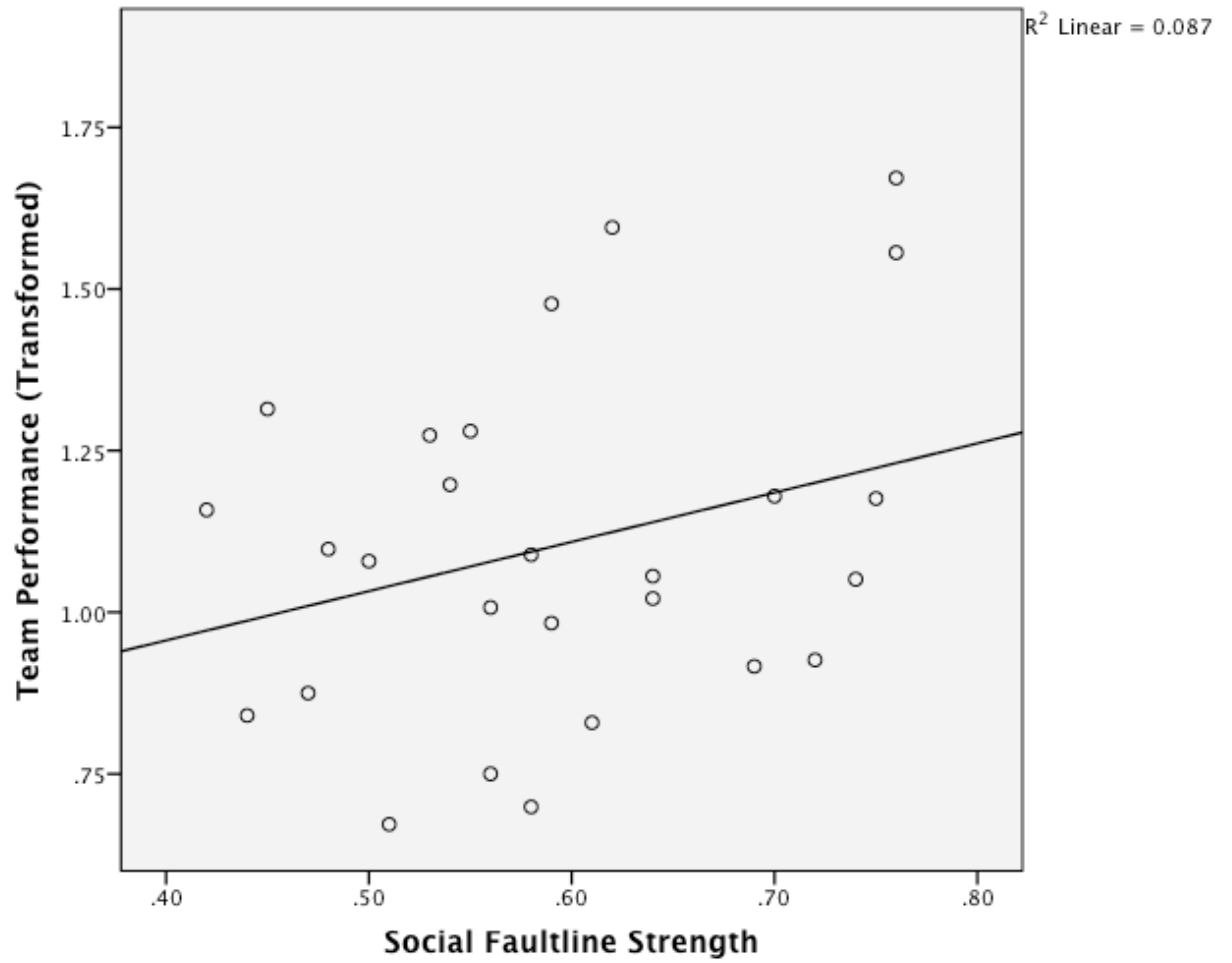


Figure 25. Scatterplot matrix plotting the relation between social faultline strength and transformed team performance. ($N=27$)

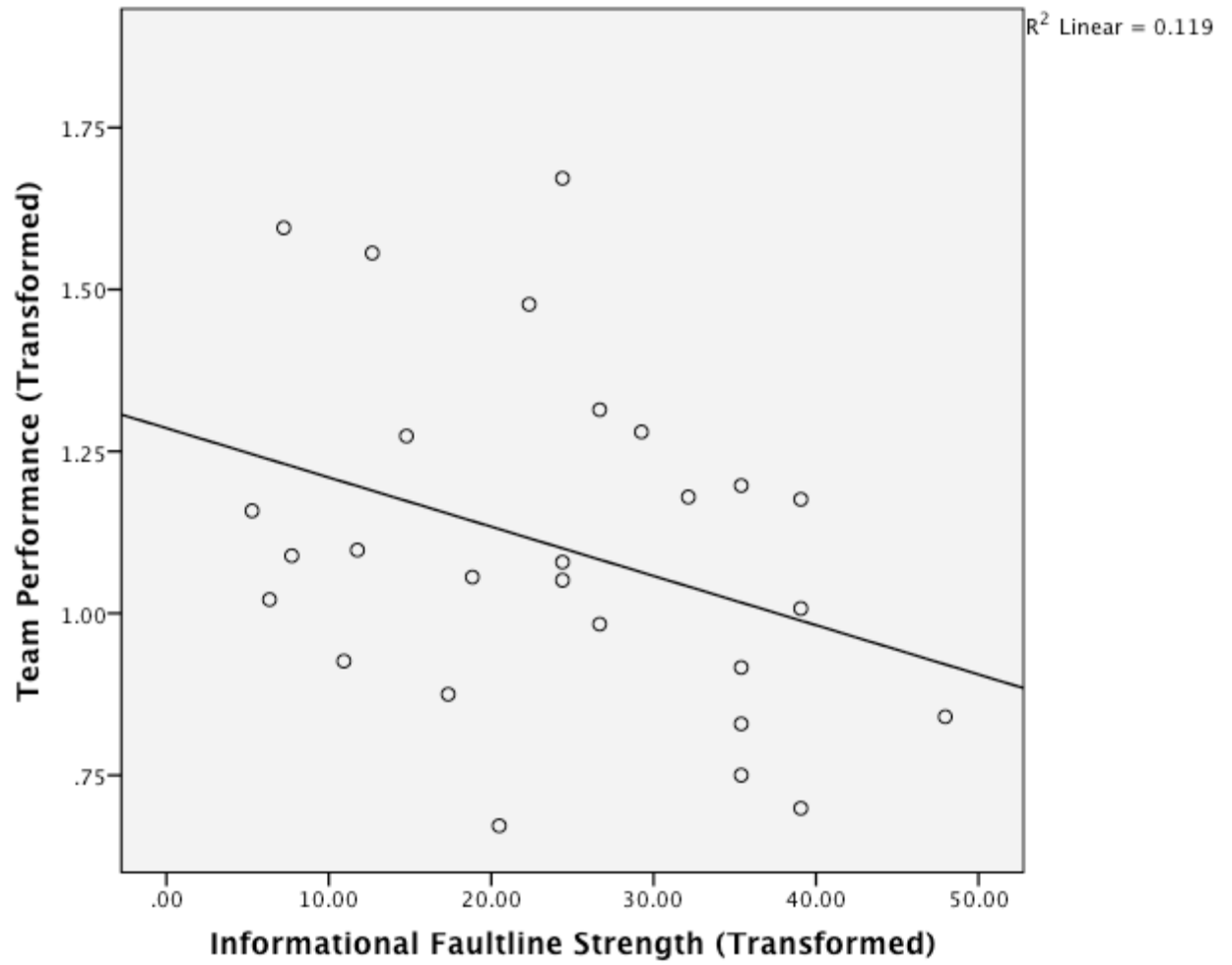


Figure 26. Scatterplot matrix plotting the relation between transformed informational faultline strength and transformed team performance. ($N=27$)

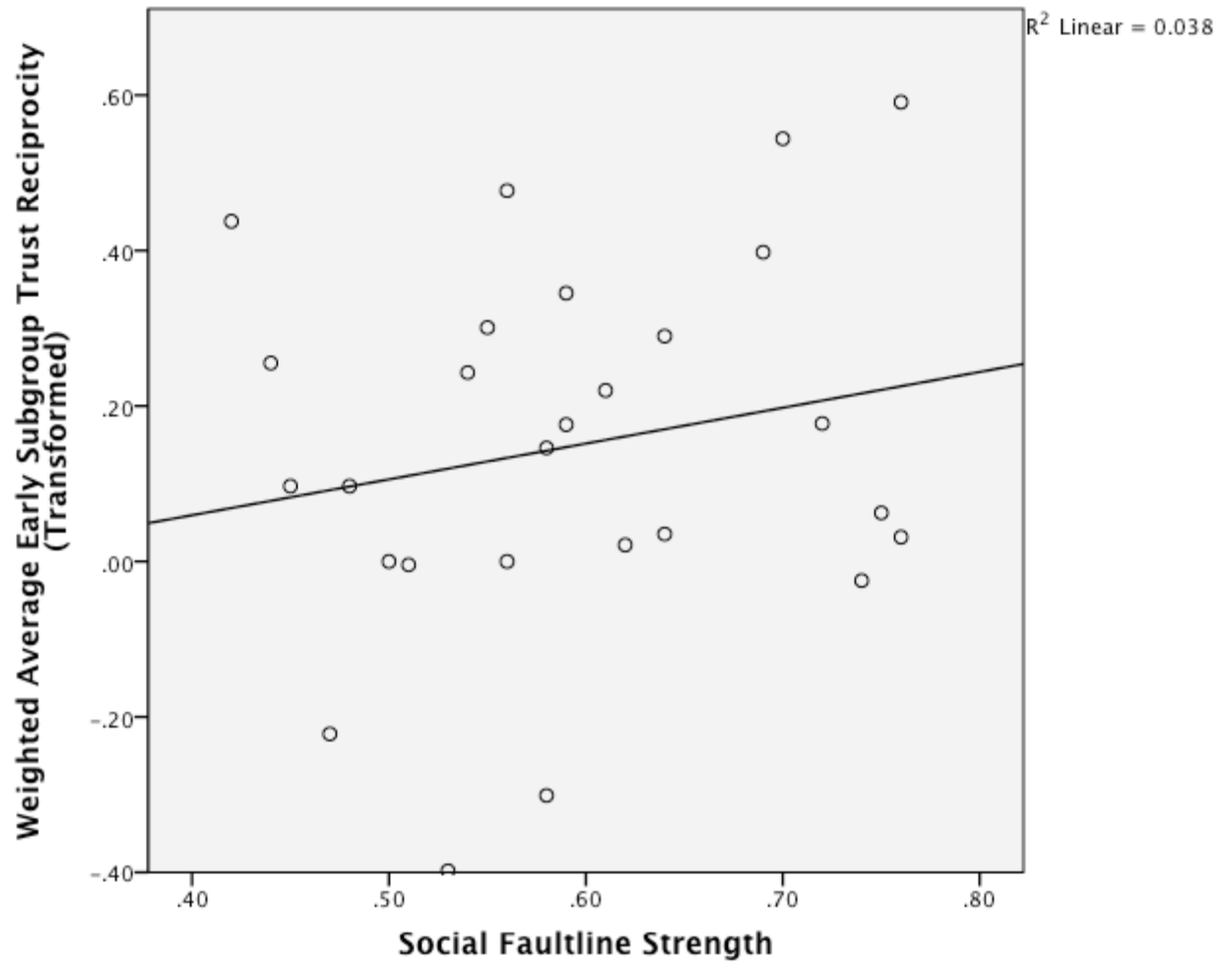


Figure 27. Scatterplot matrix plotting the relation between social faultline strength and transformed weighted average early subgroup trust reciprocity scores for networks dichotomized based on social faultline strength. ($N=27$)

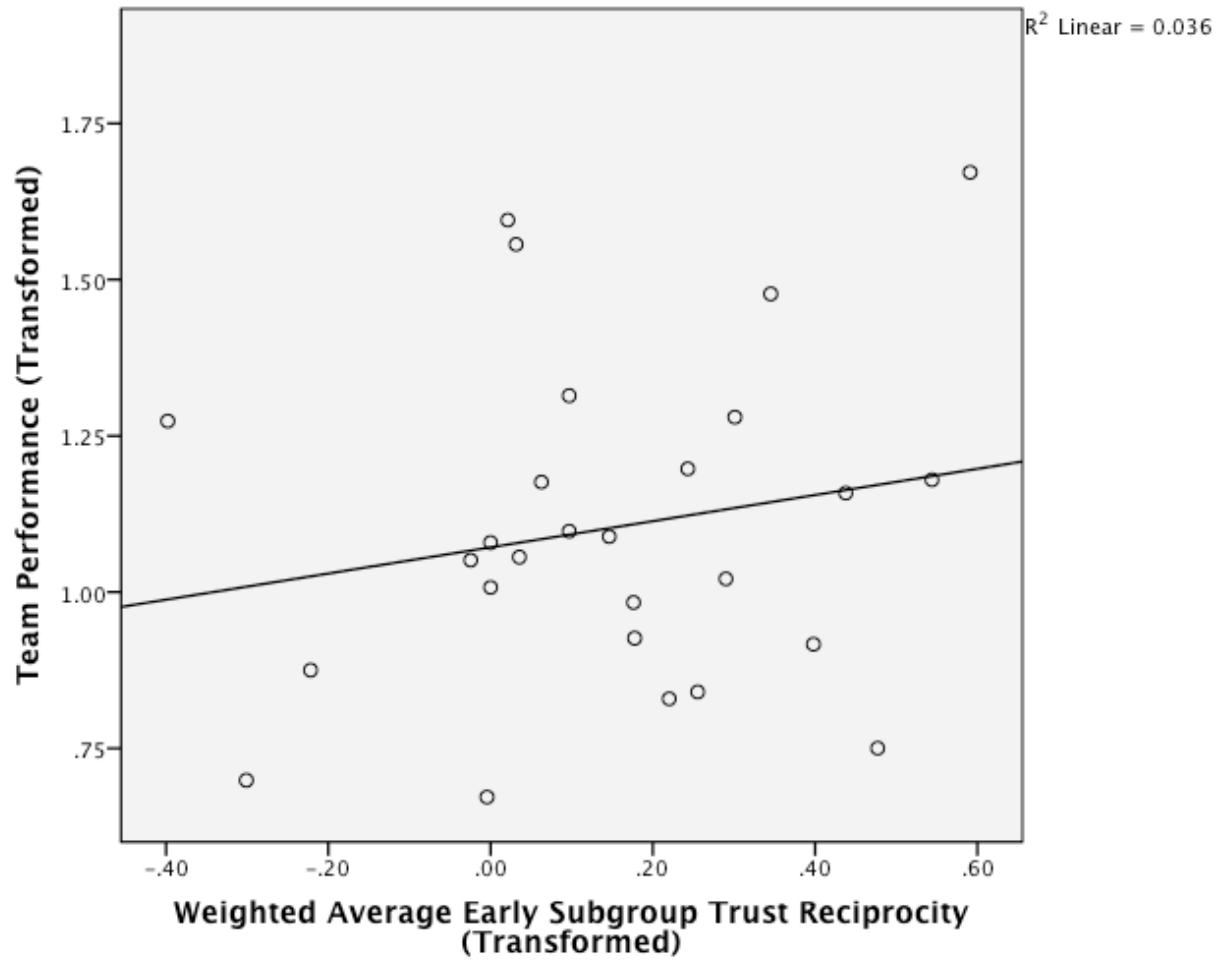


Figure 28. Scatterplot matrix plotting the relation between transformed weighted average early subgroup trust reciprocity scores for networks dichotomized based on social faultline strength and transformed team performance. ($N=27$)

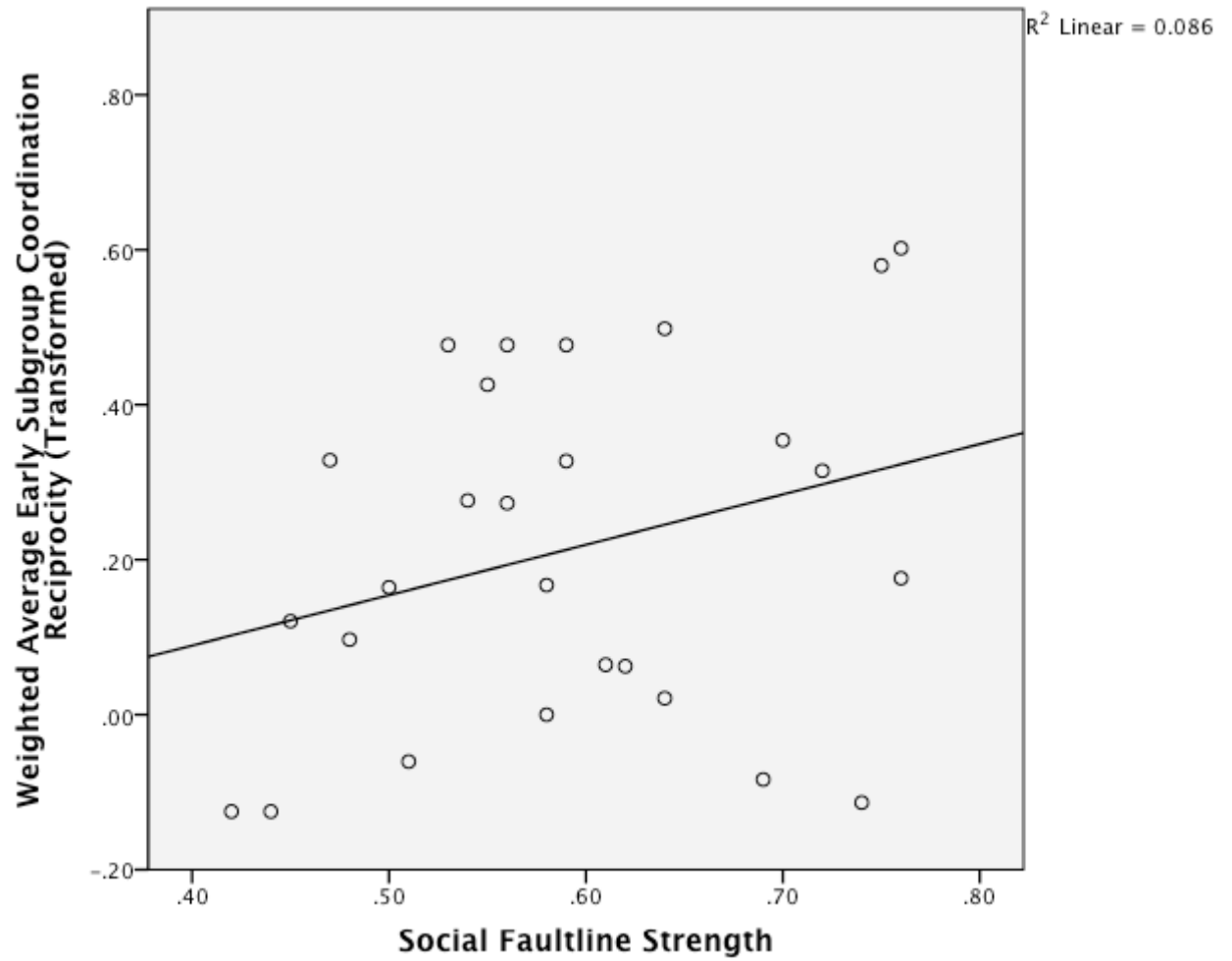


Figure 29. Scatterplot matrix plotting the relation between social faultline strength and transformed weighted average early subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength. ($N=27$)

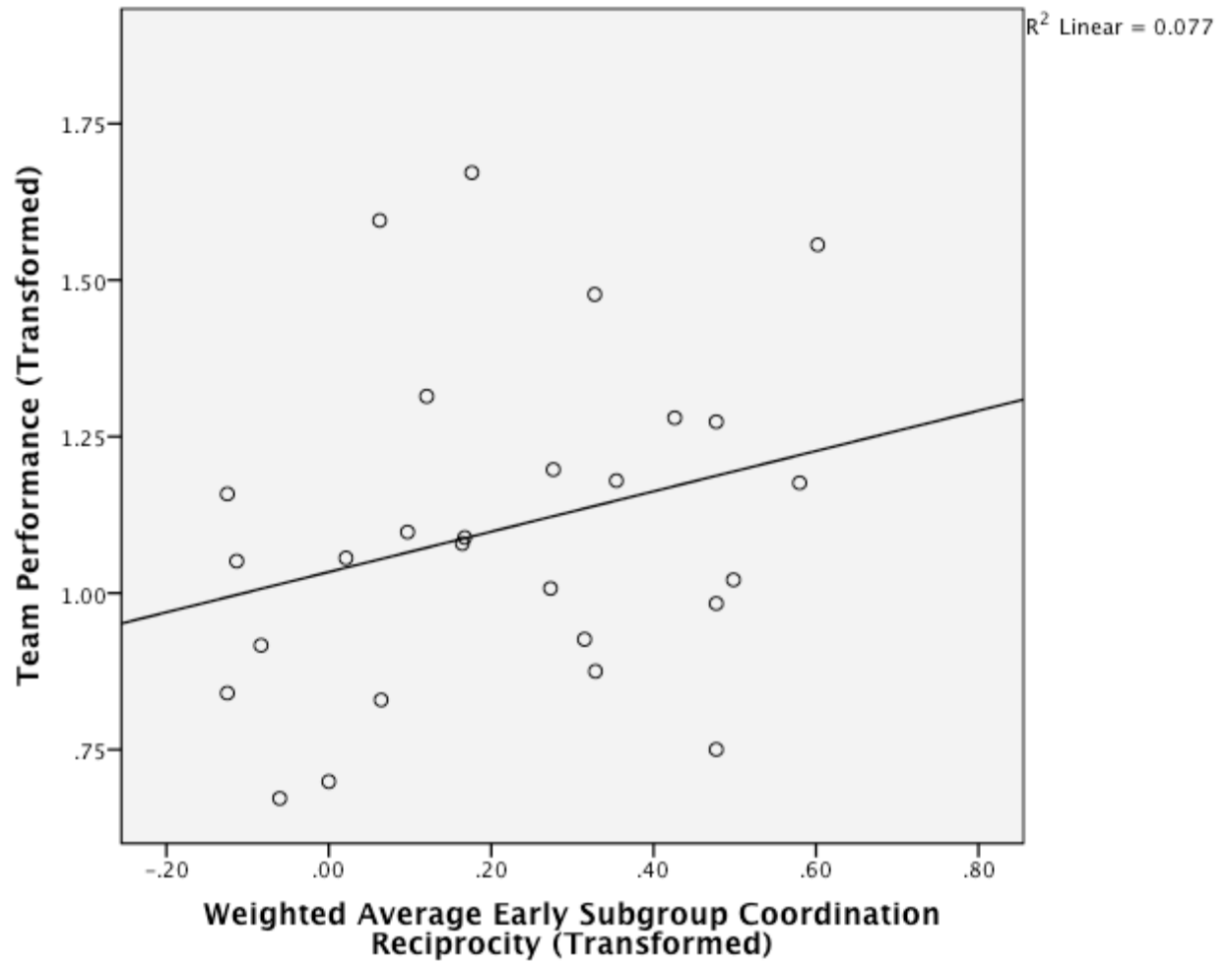


Figure 30. Scatterplot matrix plotting the relation between transformed weighted average early subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength and transformed team performance. ($N=27$)

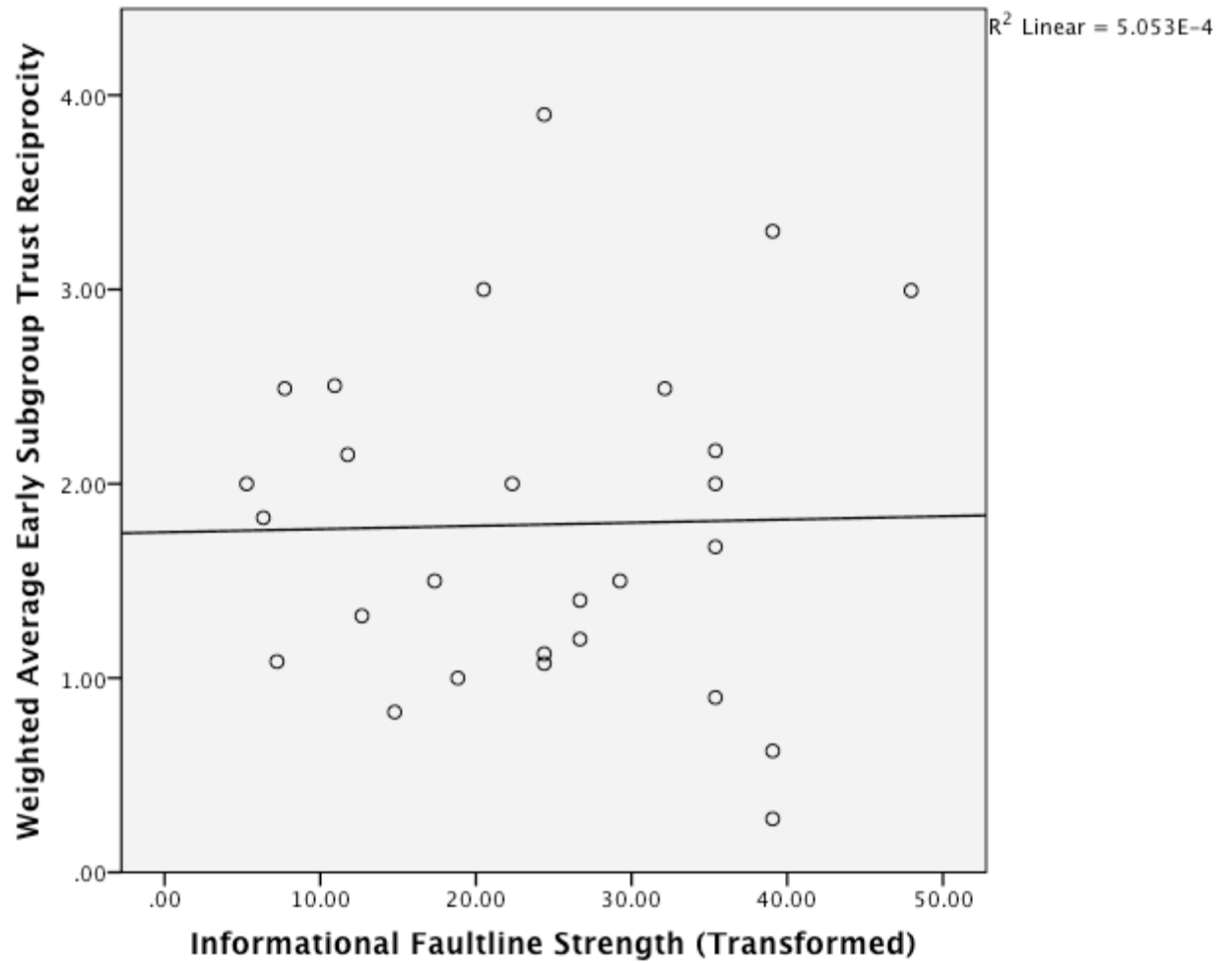


Figure 31. Scatterplot matrix plotting the relation between transformed informational faultline strength and weighted average early subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

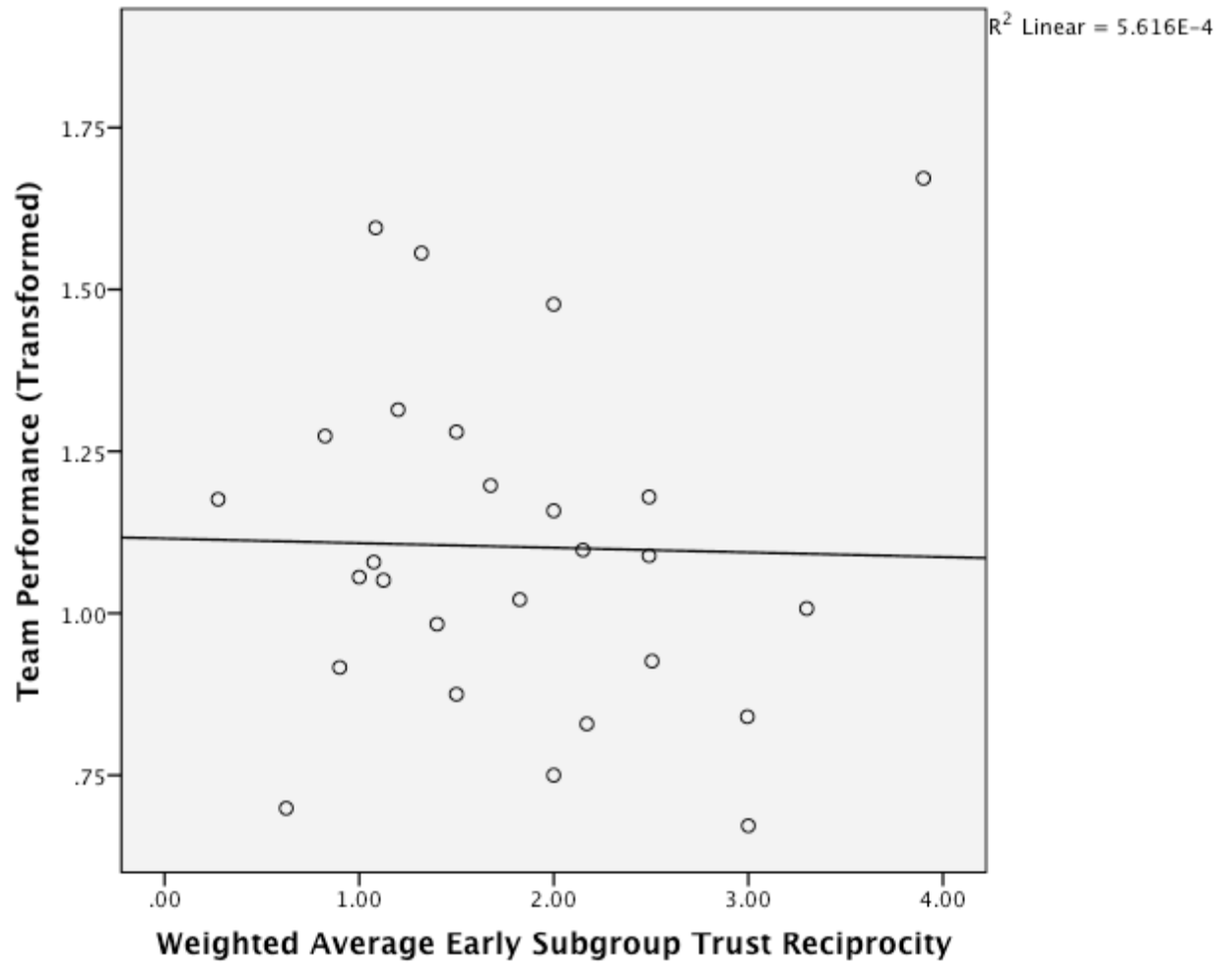


Figure 32. Scatterplot matrix plotting the relation between weighted average early subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength and transformed team performance. ($N=27$)

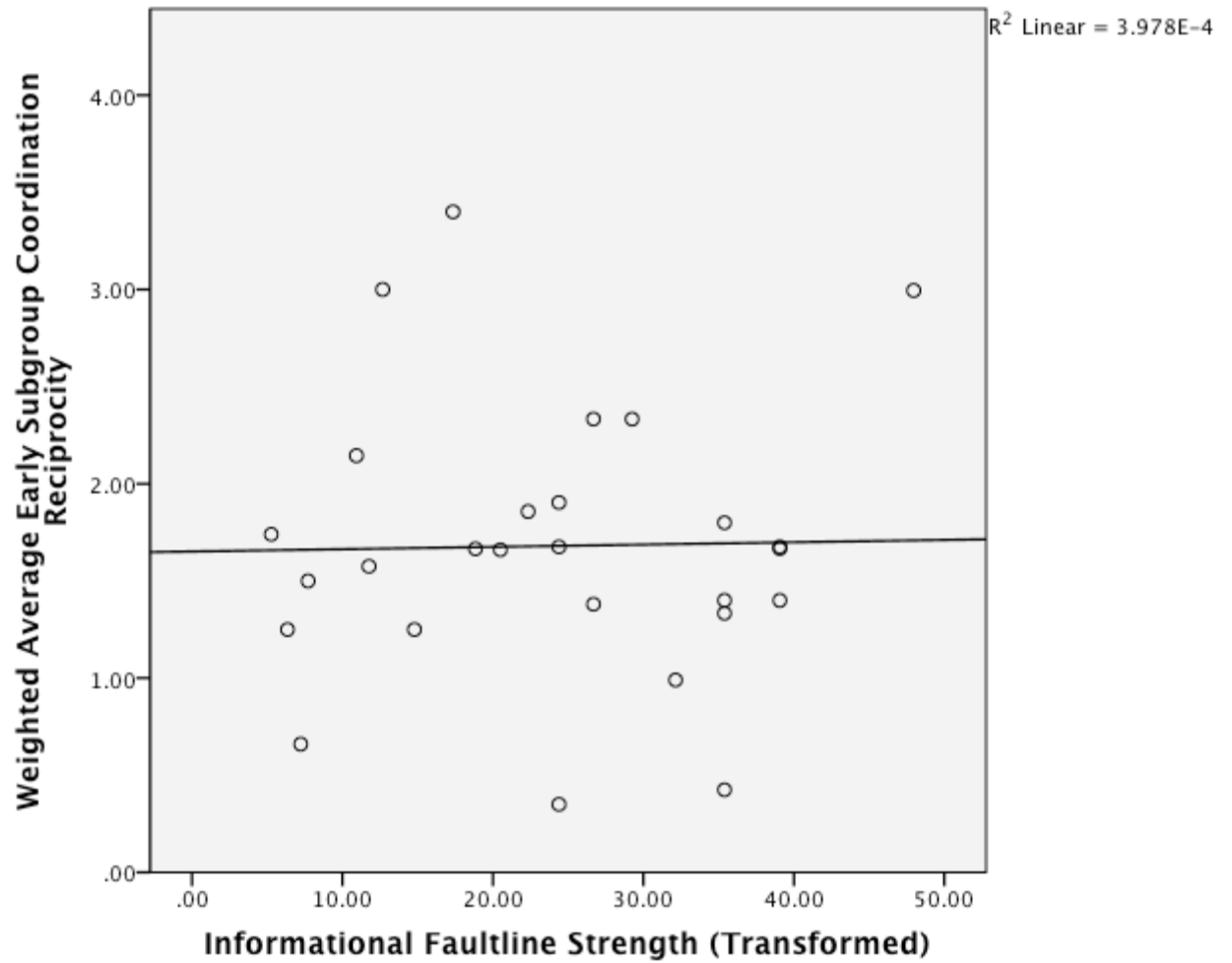


Figure 33. Scatterplot matrix plotting the relation between transformed informational faultline strength and weighted average early subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

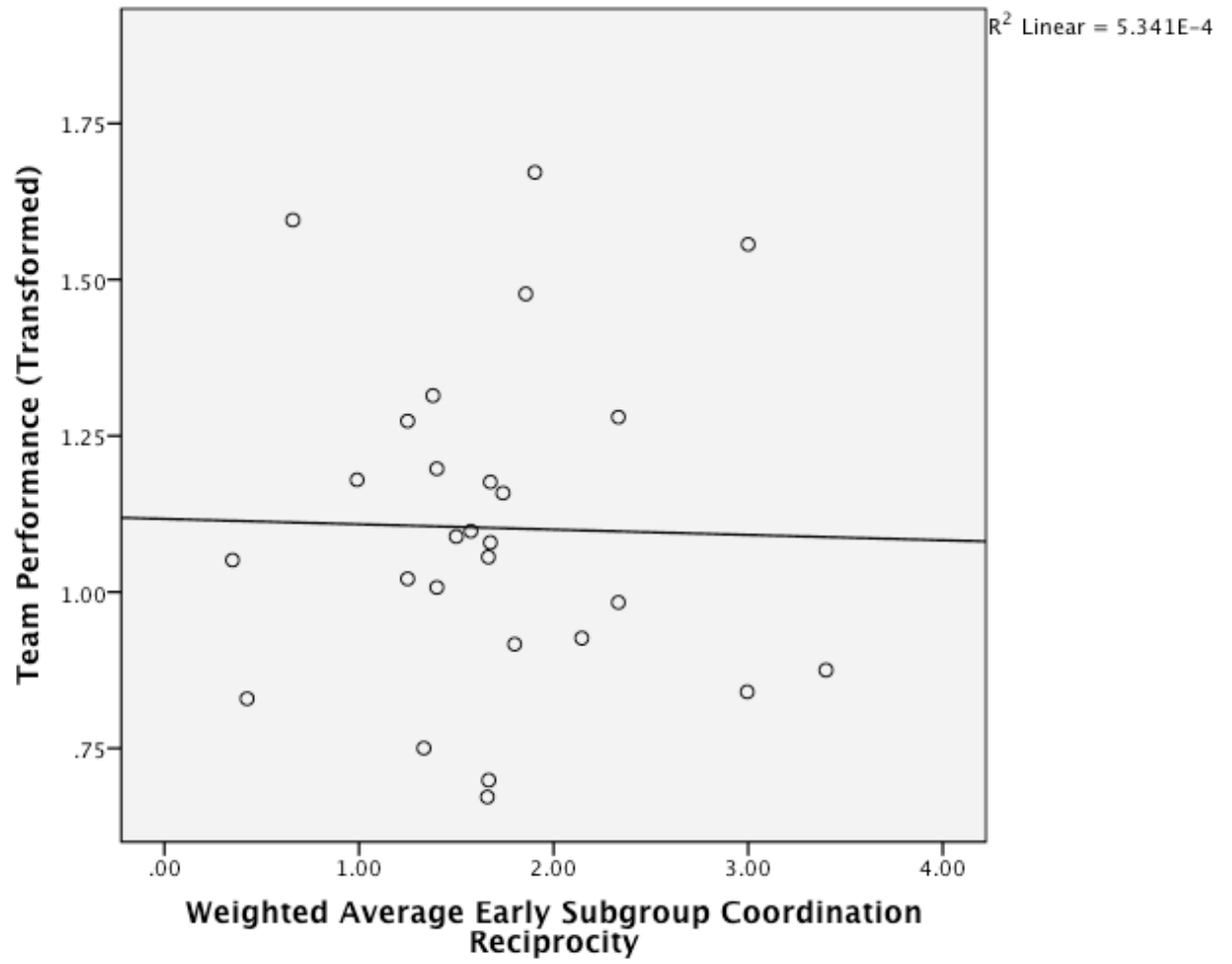


Figure 34. Scatterplot matrix plotting the relation between weighted average early subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength and transformed team performance. ($N=27$)

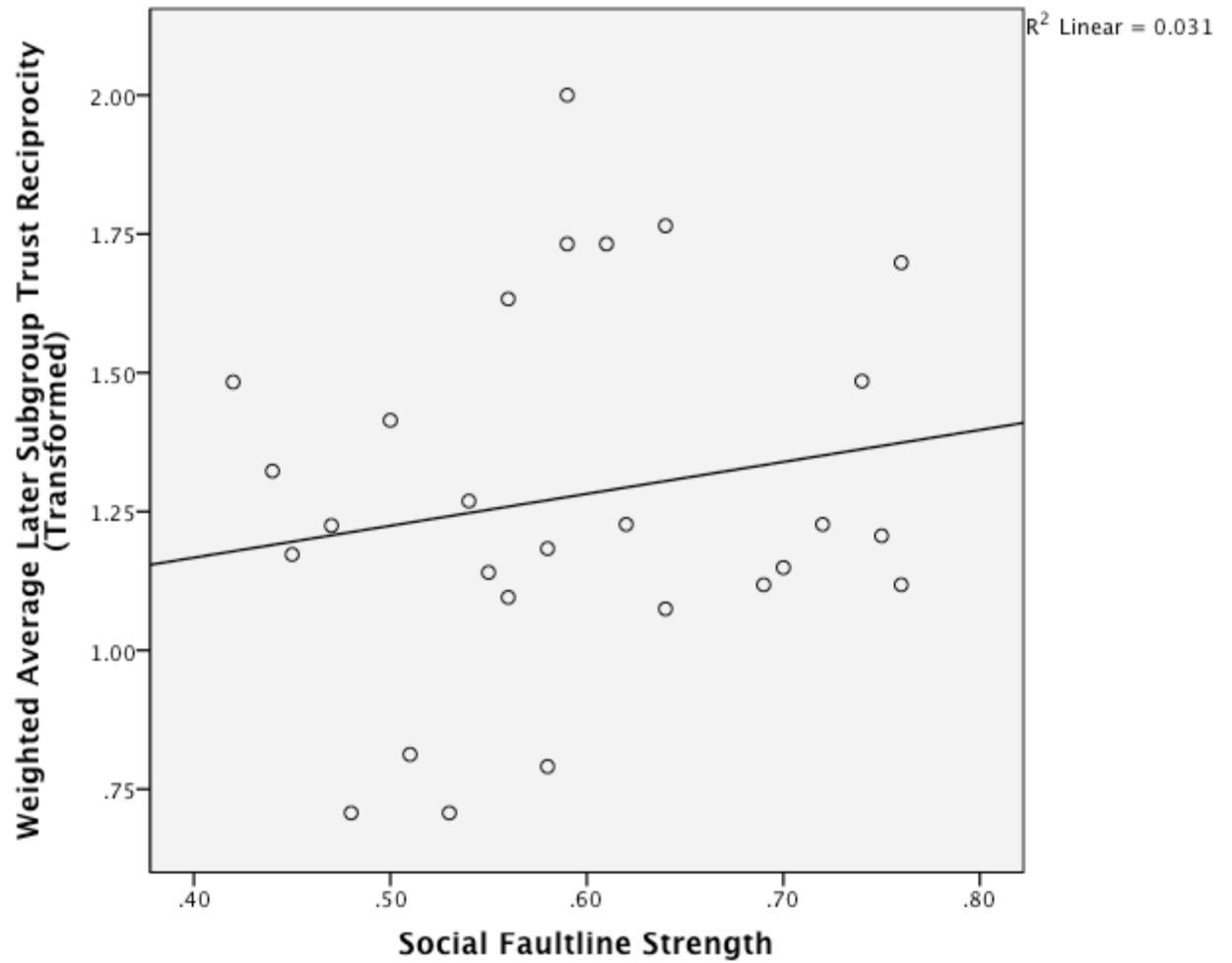


Figure 35. Scatterplot matrix plotting the relation between social faultline strength and transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on social faultline strength. ($N=27$)

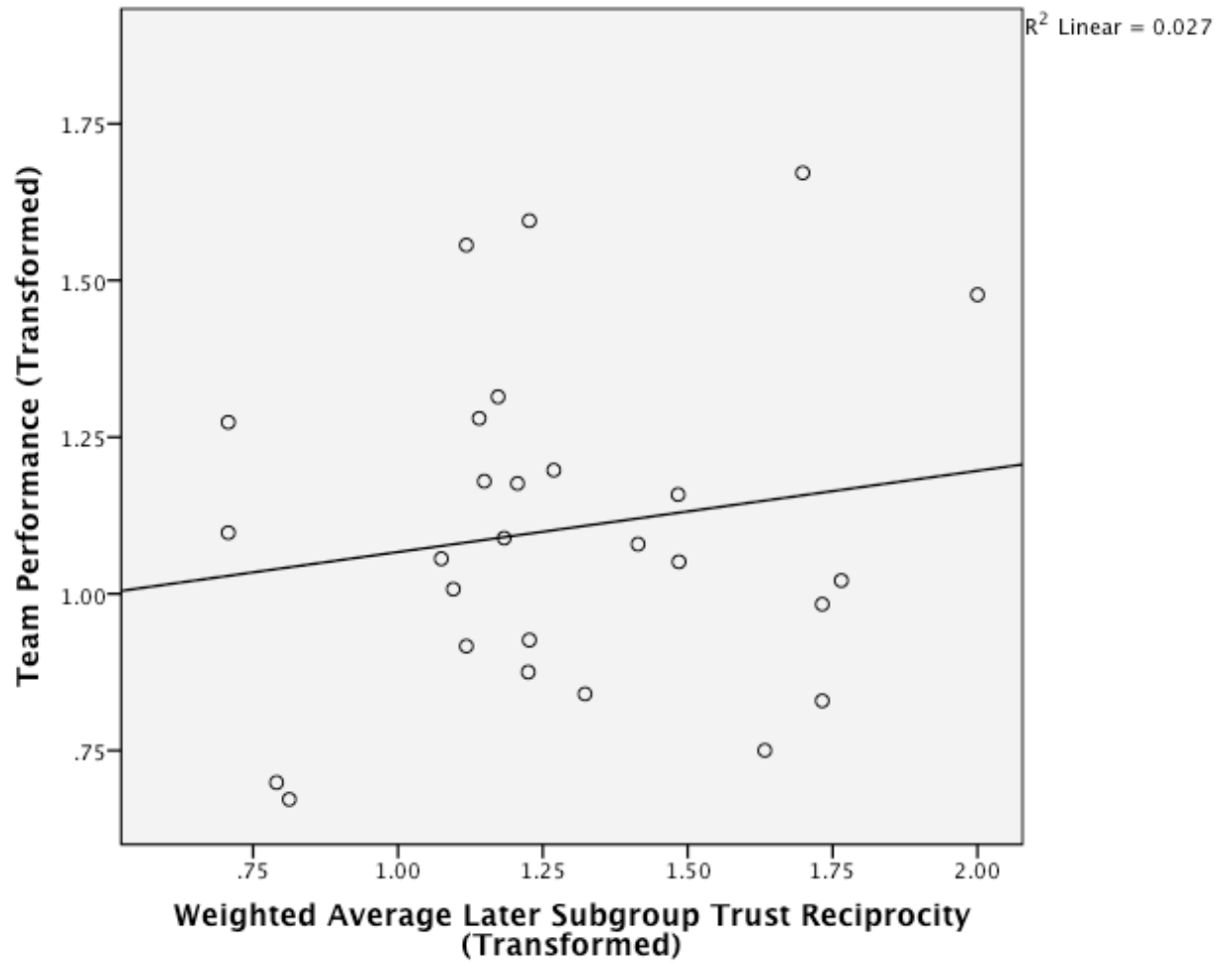


Figure 36. Scatterplot matrix plotting the relation between transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on social faultline strength and transformed team performance. ($N=27$)

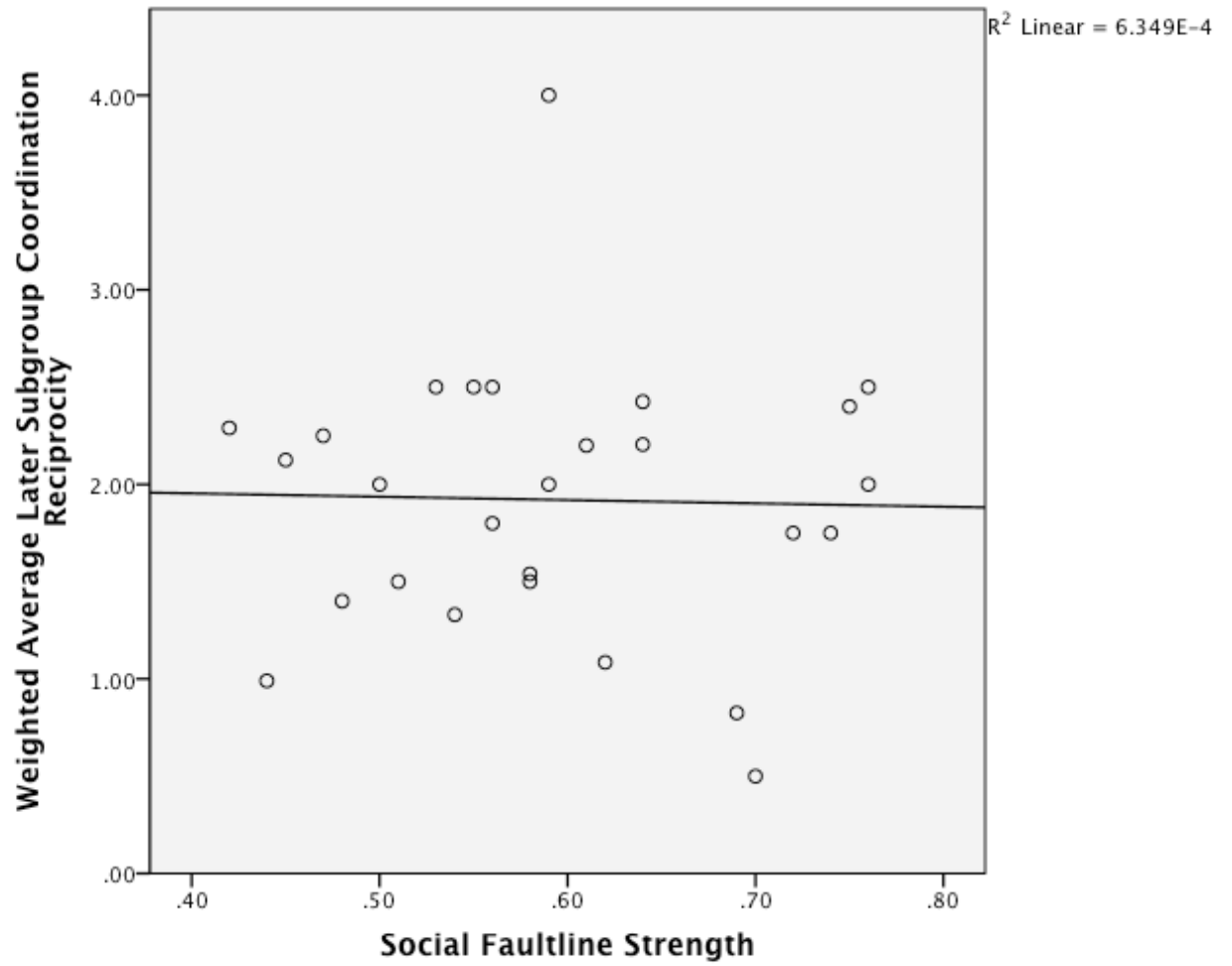


Figure 37. Scatterplot matrix plotting the relation between social faultline strength and weighted average later subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength. ($N=27$)

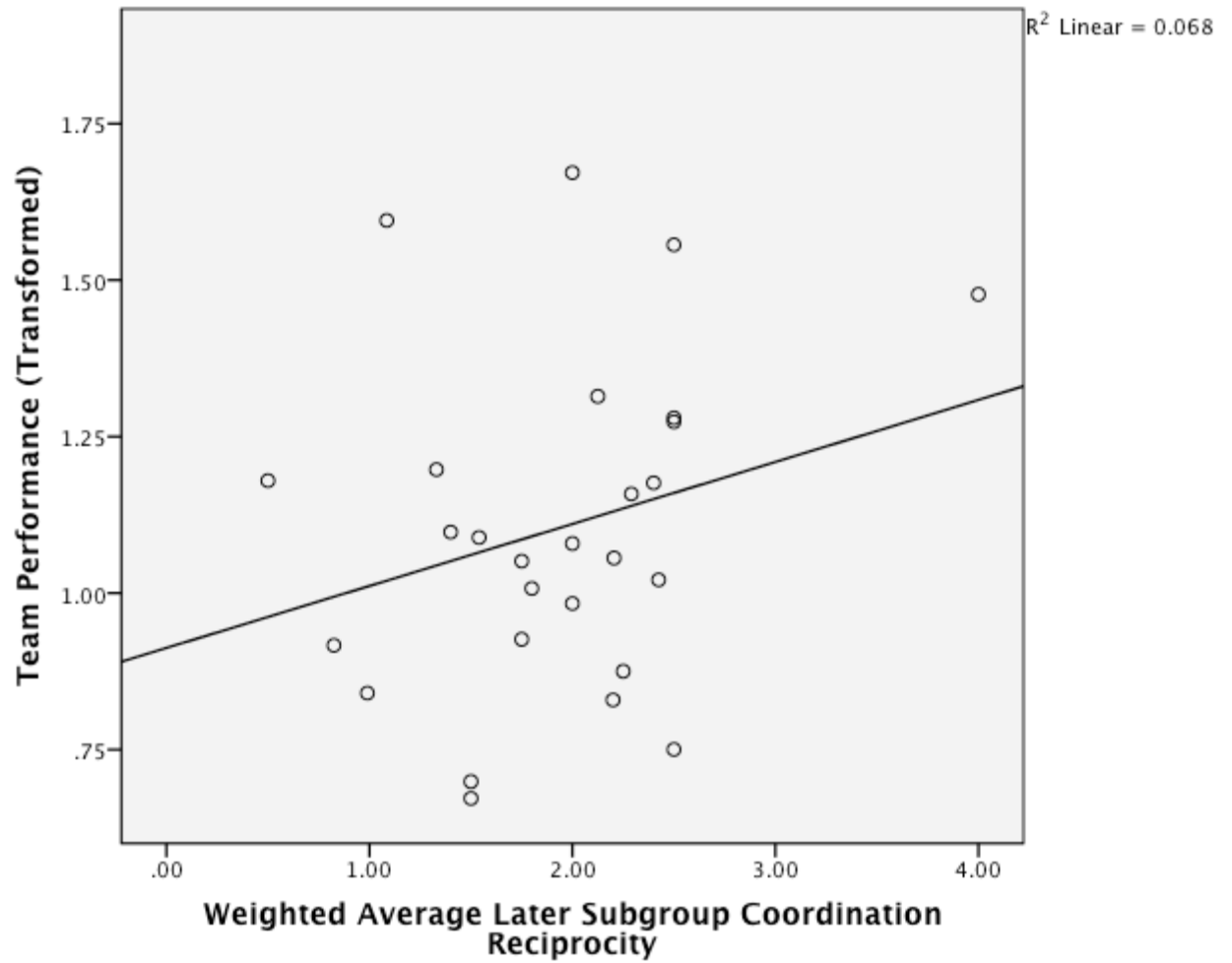


Figure 38. Scatterplot matrix plotting the relation between weighted average later subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength and transformed team performance. ($N=27$)

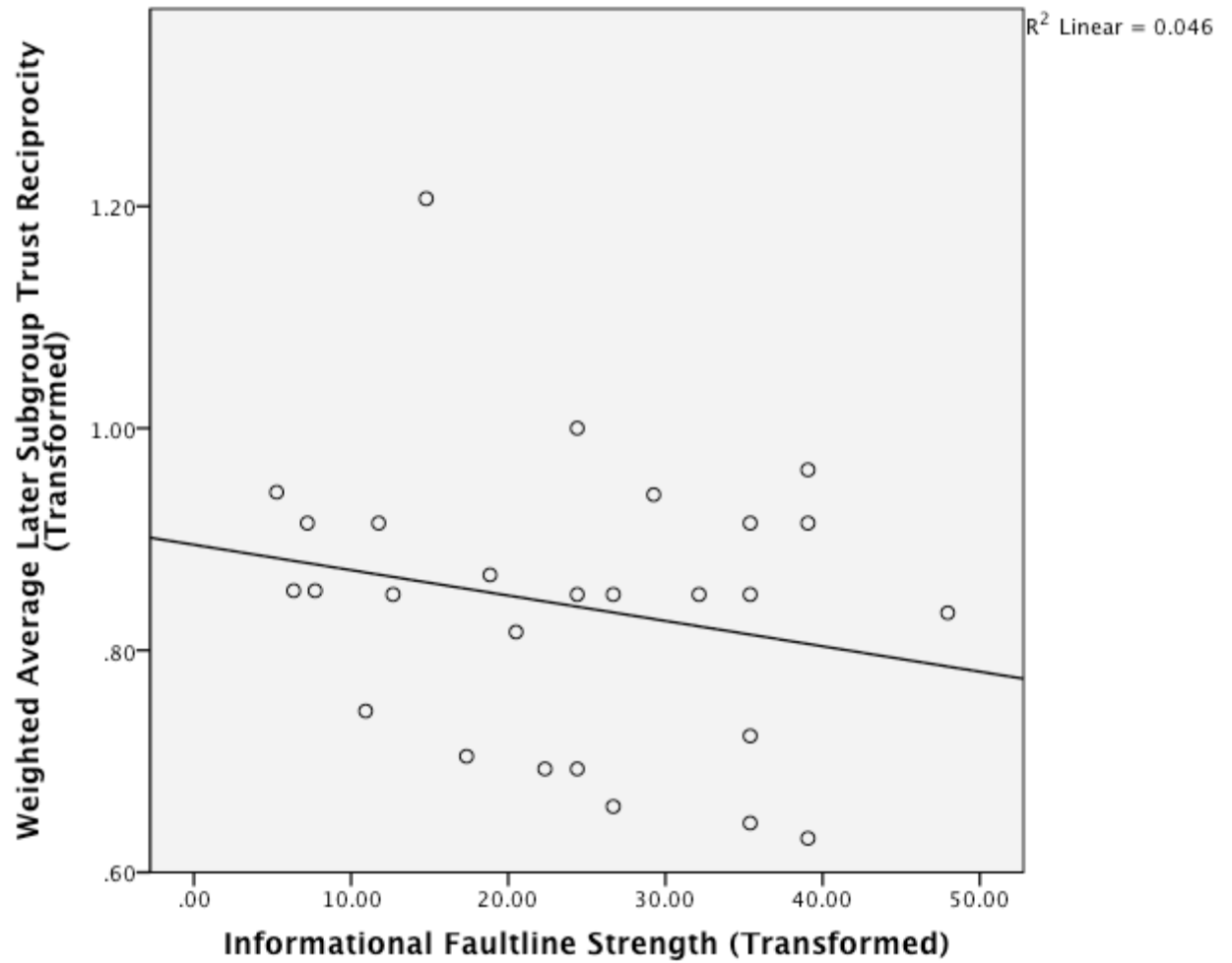


Figure 39. Scatterplot matrix plotting the relation between transformed informational faultline strength and transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

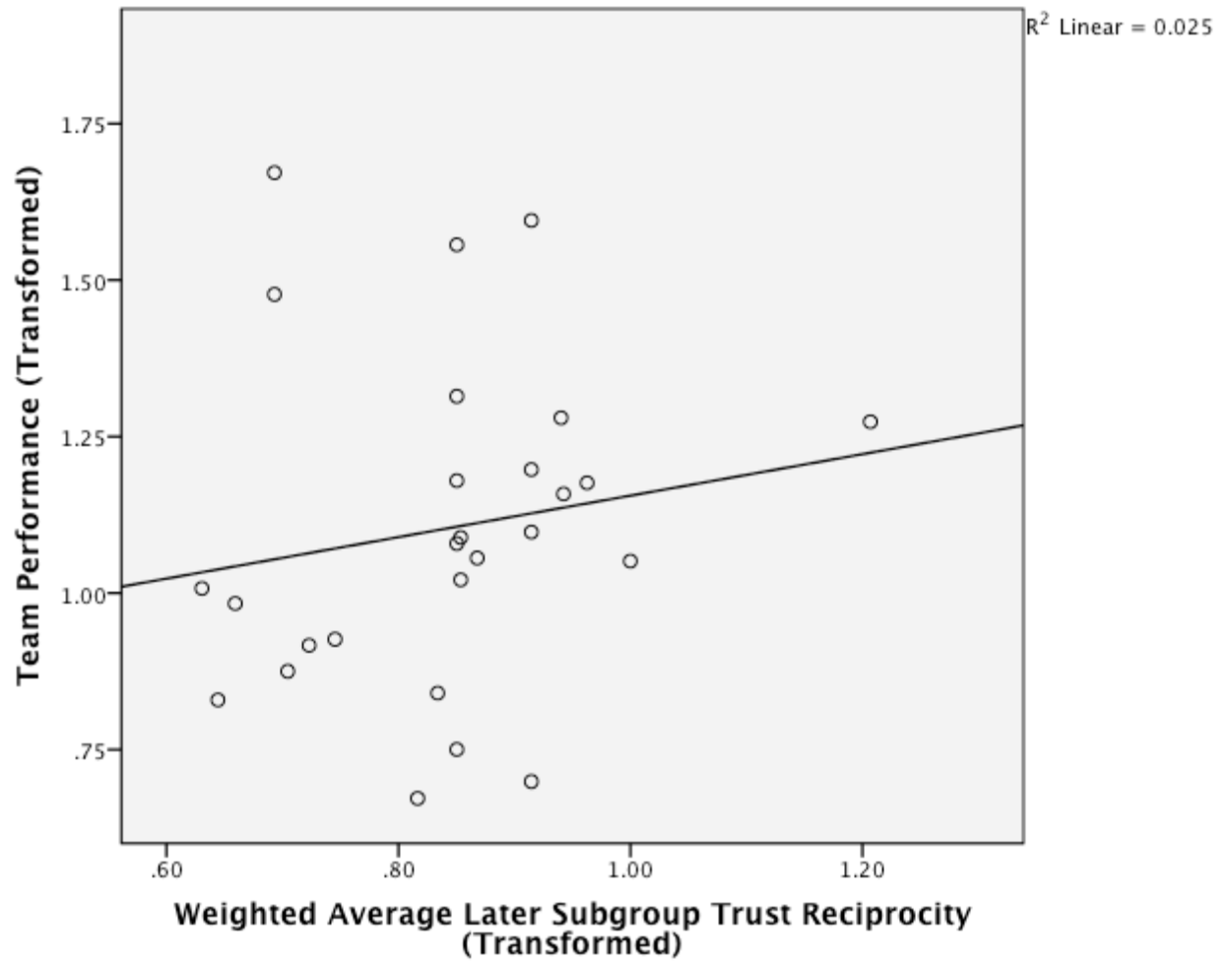


Figure 40. Scatterplot matrix plotting the relation between transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength and transformed team performance. ($N=27$)

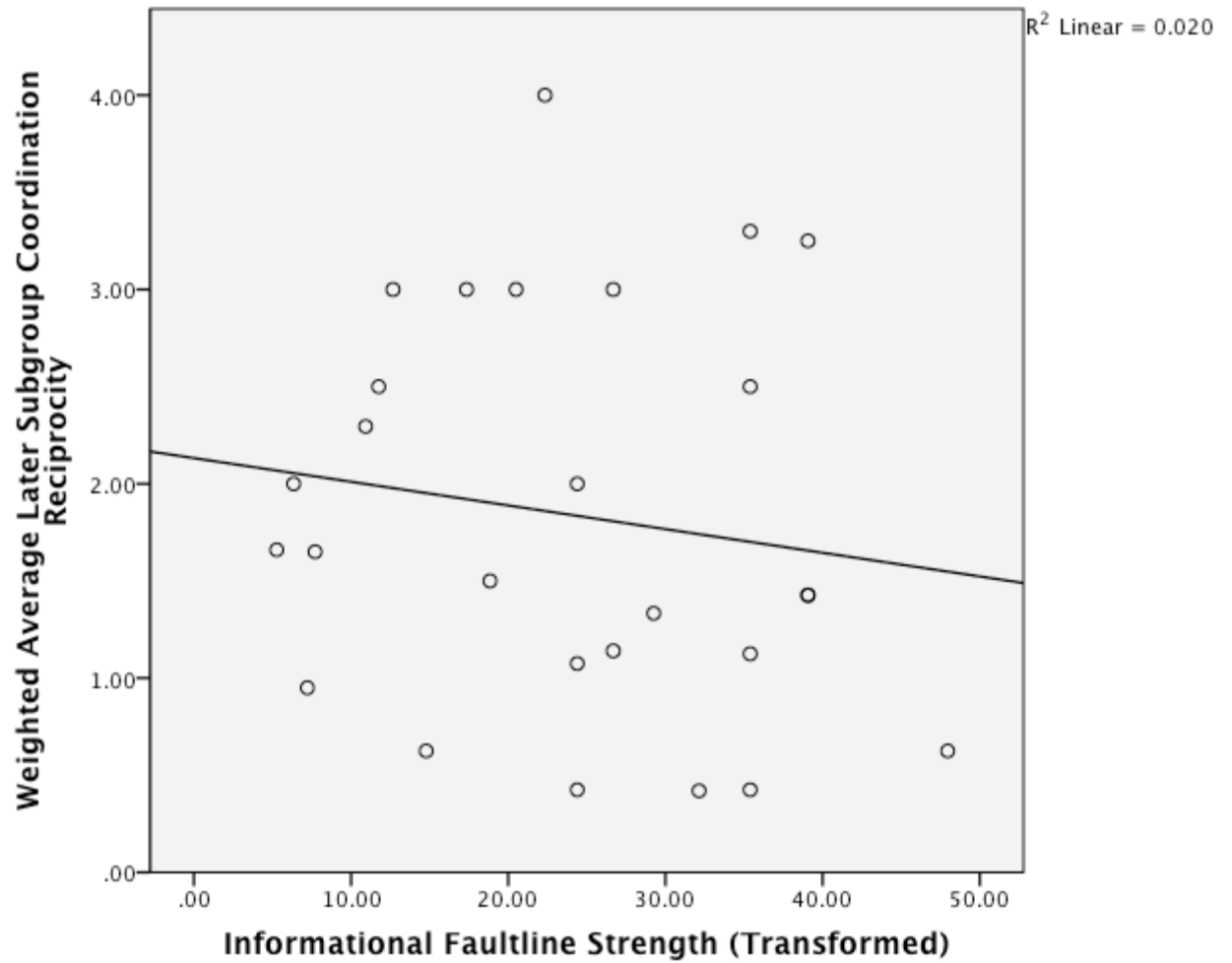


Figure 41. Scatterplot matrix plotting the relation between transformed informational faultline strength and weighted average later subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength. ($N=27$)

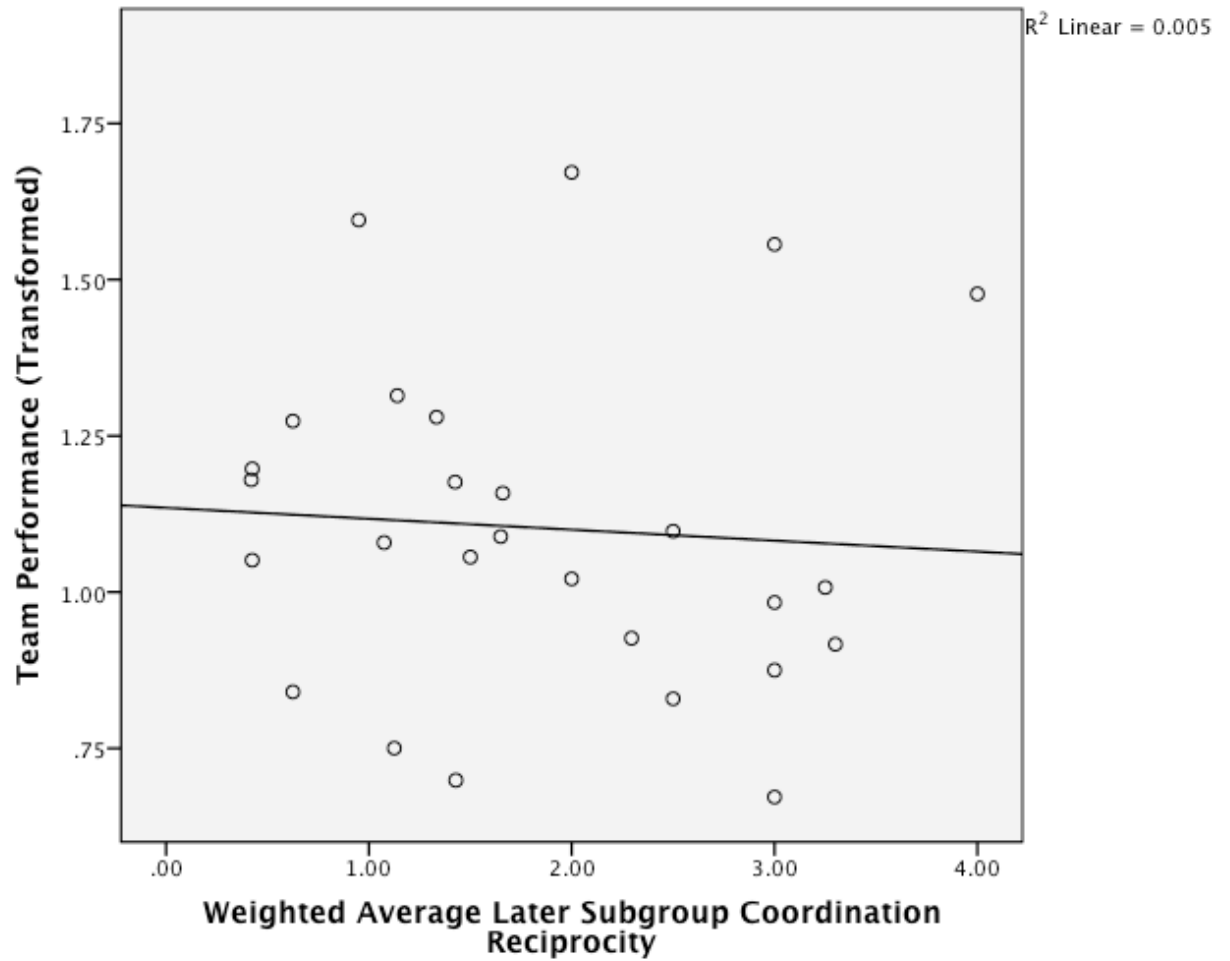


Figure 42. Scatterplot matrix plotting the relation between weighted average later subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength and transformed team performance. ($N=27$)

Heteroscedasticity

Scatterplots of residuals are commonly used to assess heteroscedasticity of data via the “eyeballing” method—doing a visual search for areas where residual values are clumped together. Optimally, all of the points in these scatterplots should be randomly scattered, indicating that the data’s error is not systematic. Scatterplot matrices of residuals for the current study’s regression analyses, as seen in Figures 43 through 60, indicated random scattering of residuals.

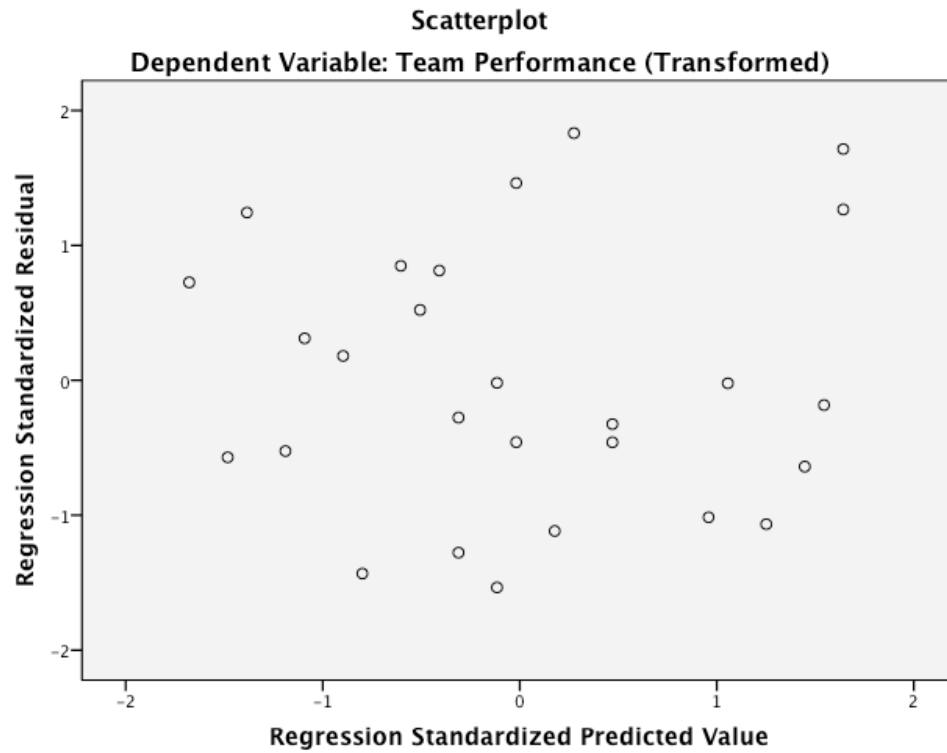


Figure 43. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on social faultline strength. ($N=27$)

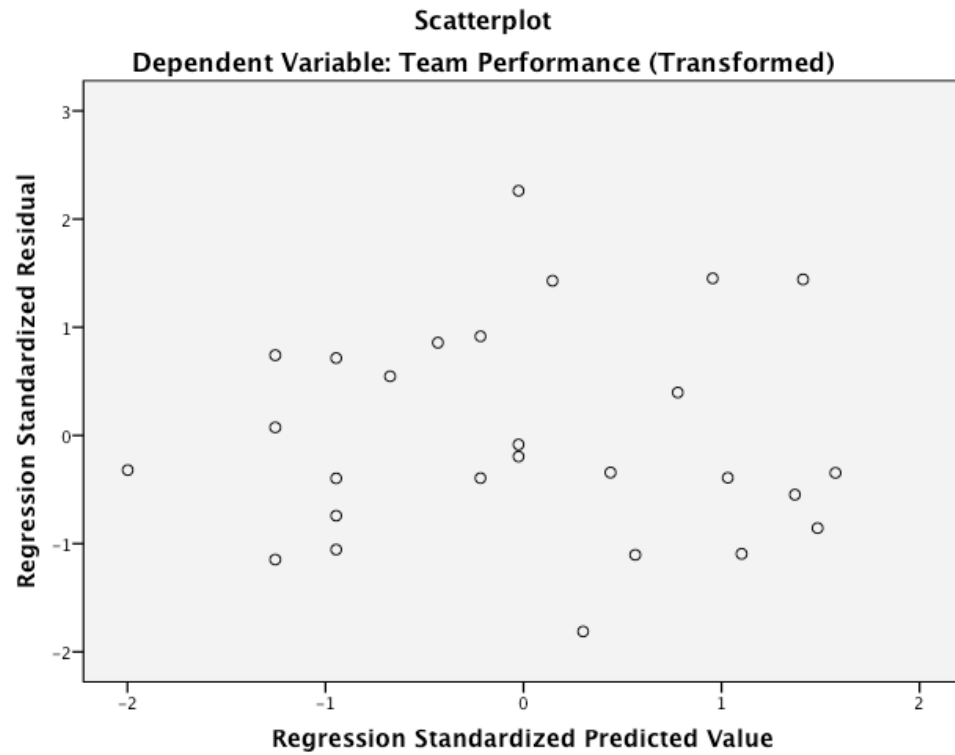


Figure 44. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on transformed informational faultline strength. ($N=27$)

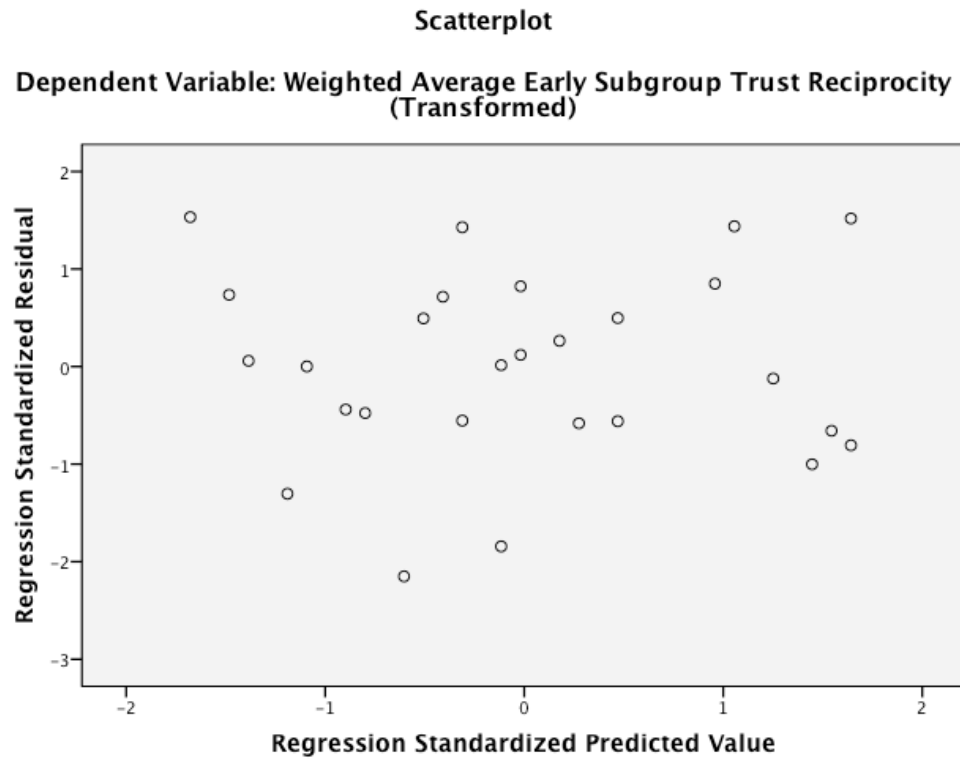


Figure 45. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed weighted average early subgroup trust reciprocity scores for networks dichotomized based on social faultline strength on social faultline strength. ($N=27$)

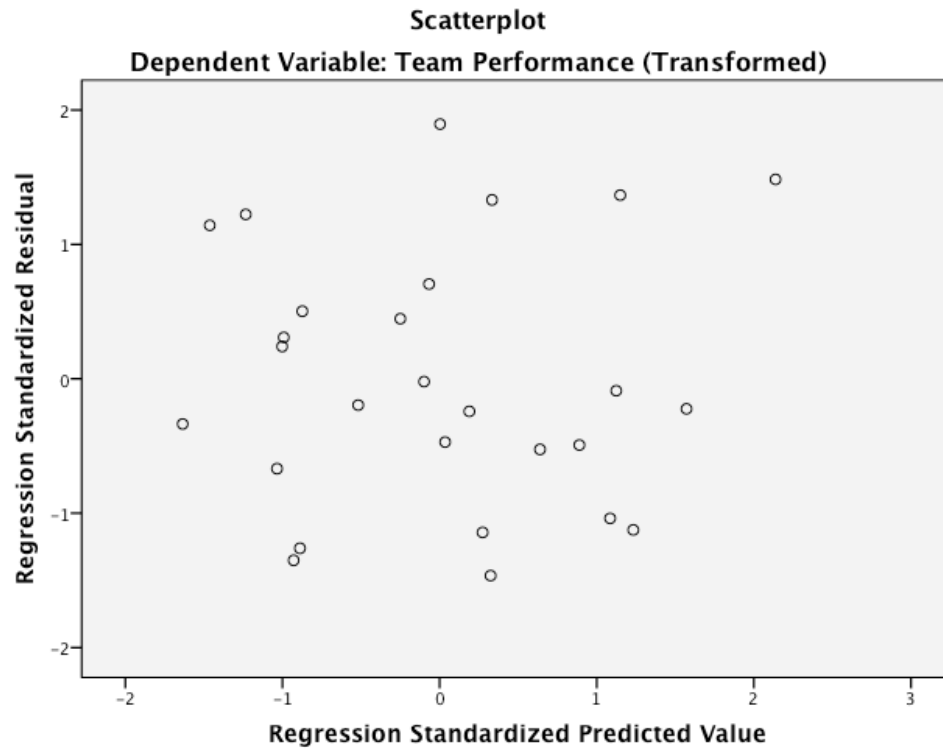


Figure 46. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on transformed weighted average early subgroup trust reciprocity scores for networks dichotomized based on social faultline strength and social faultline strength. ($N=27$)

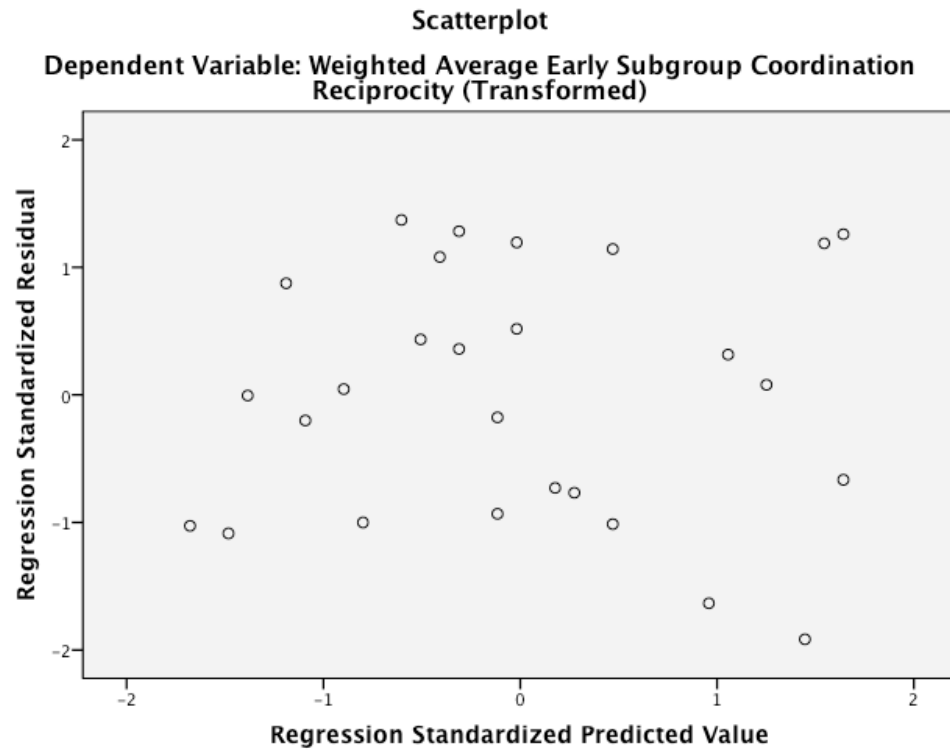


Figure 47. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed weighted average early subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength on social faultline strength. ($N=27$)

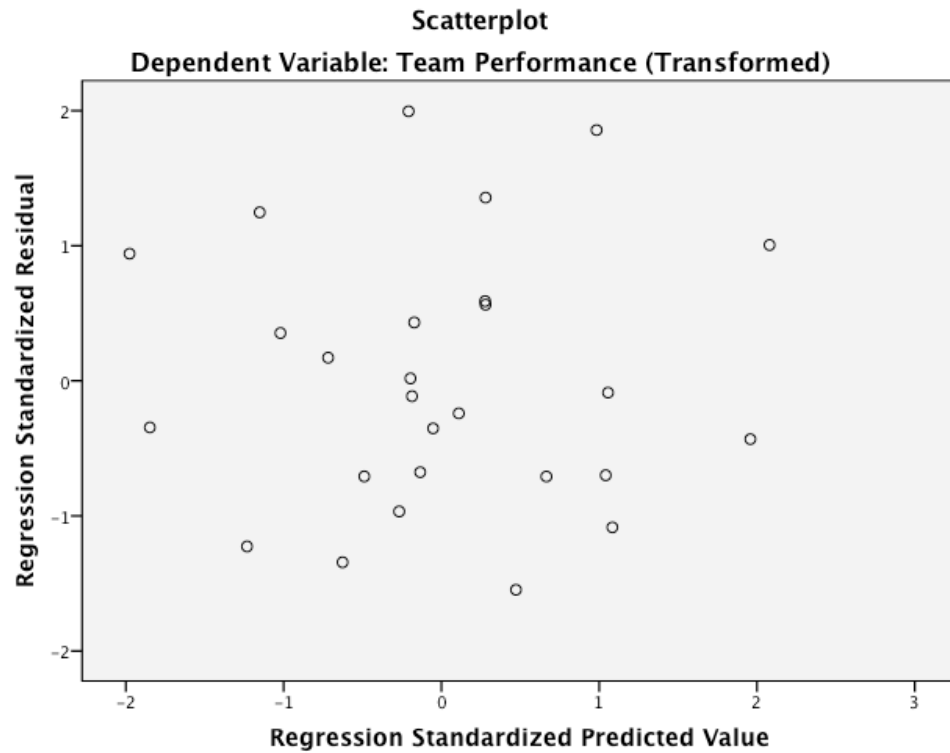


Figure 48. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on transformed weighted average early subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength and social faultline strength. ($N=27$)

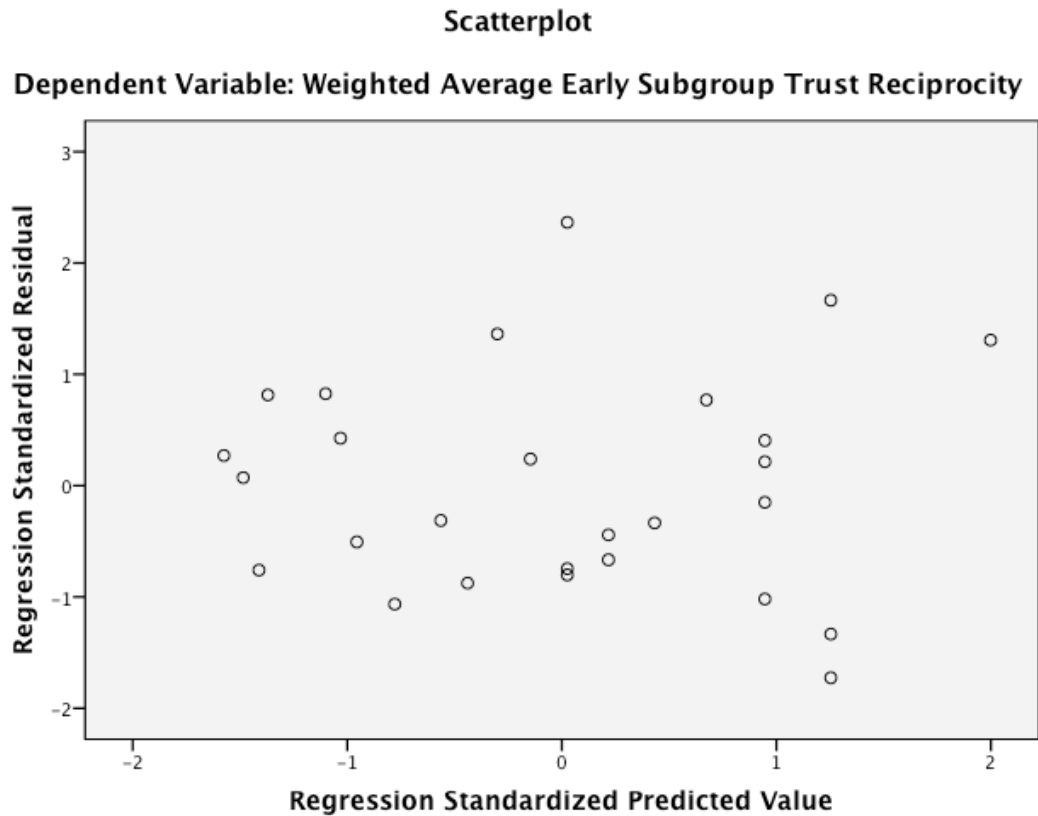


Figure 49. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing weighted average early subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength on transformed informational faultline strength. ($N=27$)

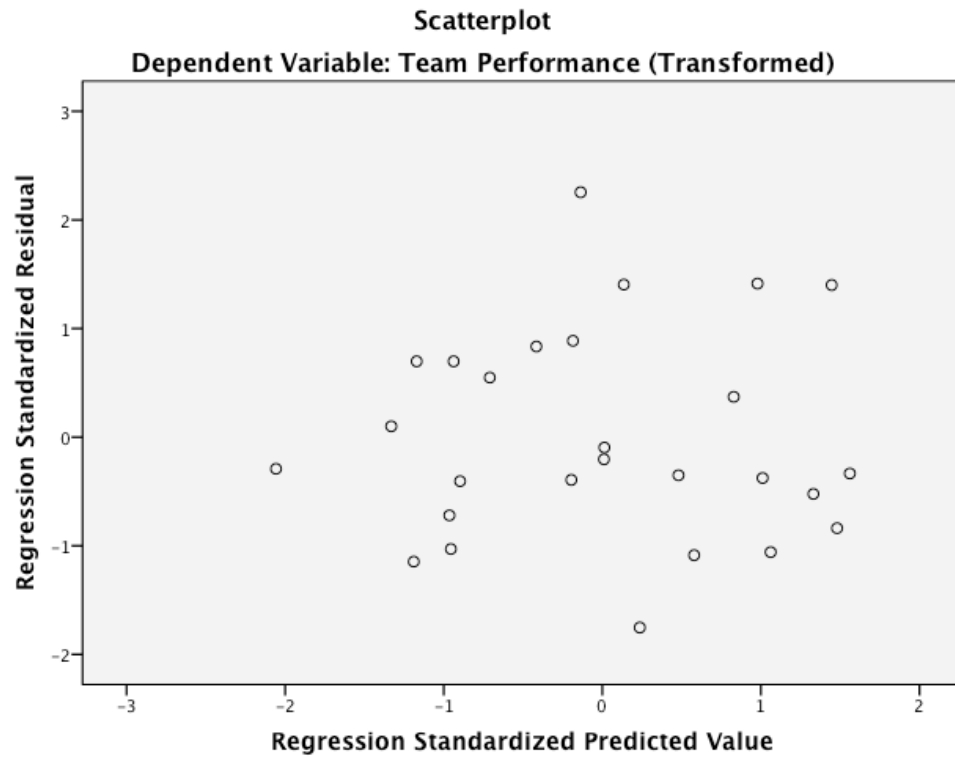


Figure 50. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on weighted average early subgroup trust reciprocity scores for networks dichotomized based on transformed informational faultline strength and informational faultline strength. ($N=27$)

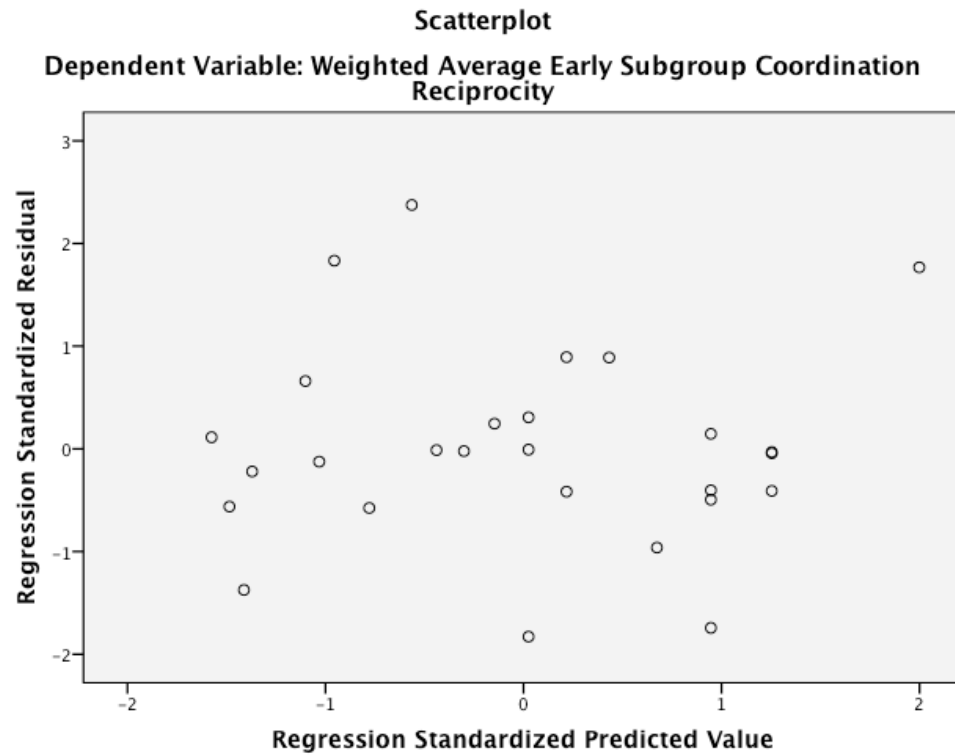


Figure 51. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing weighted average early subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength on transformed informational faultline strength. ($N=27$)

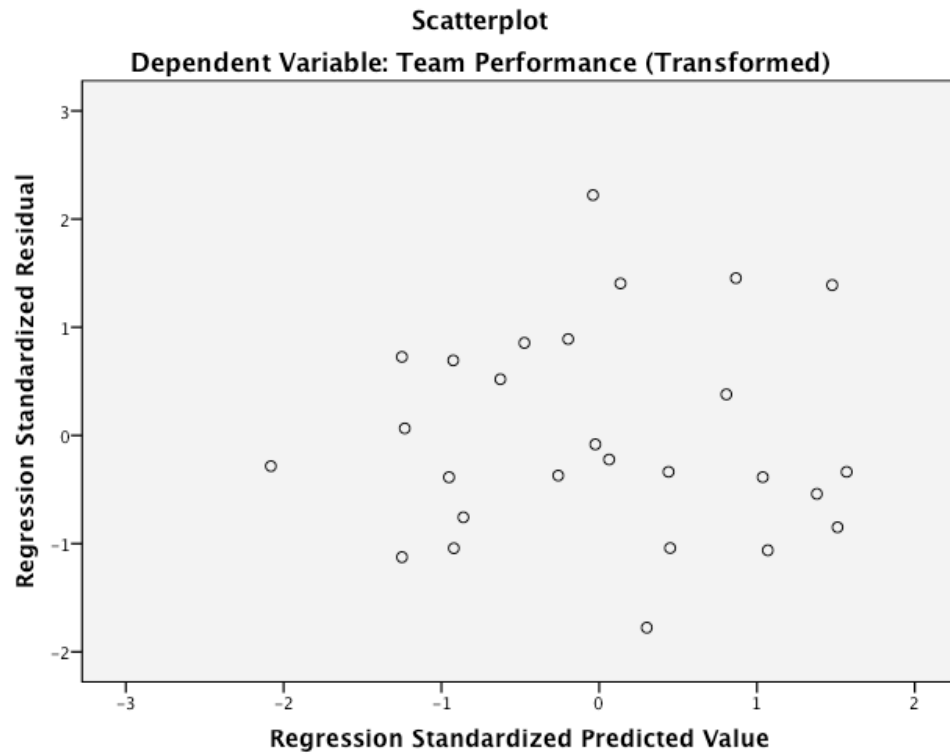


Figure 52. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on weighted average early subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength and transformed informational faultline strength. ($N=27$)

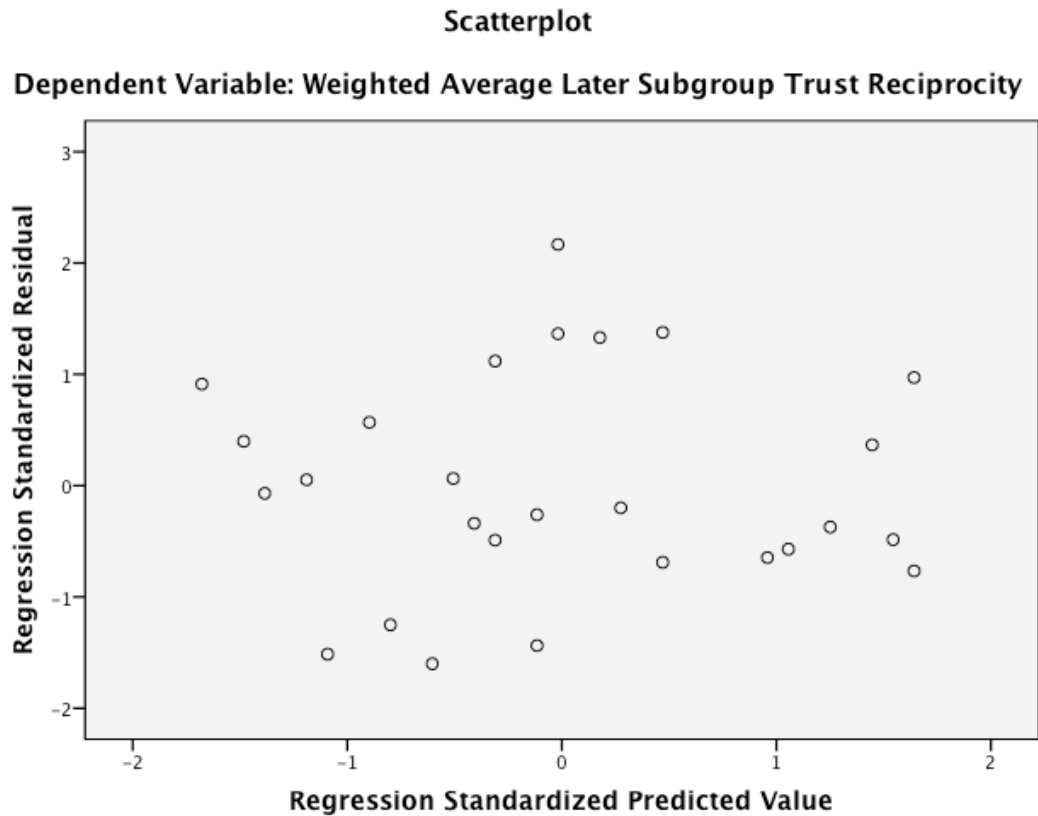


Figure 53. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on social faultline strength on social faultline strength. ($N=27$)

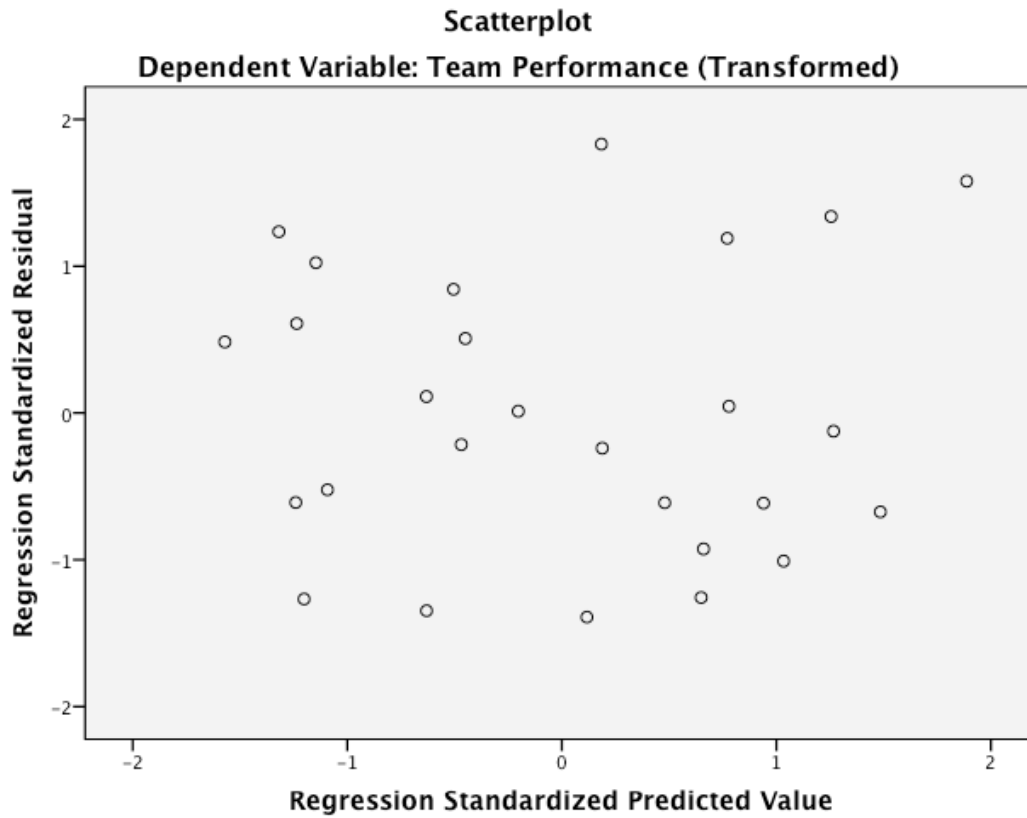


Figure 54. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on social faultline strength and social faultline strength. ($N=27$)

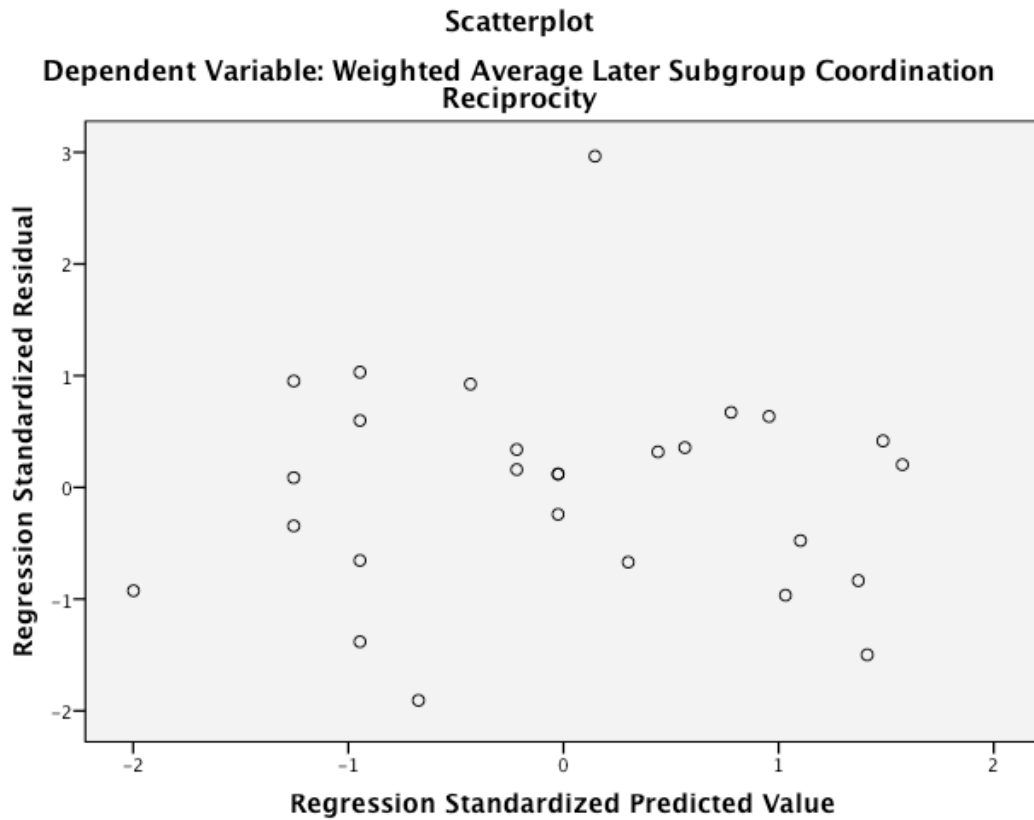


Figure 55. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing weighted average later subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength on social faultline strength. ($N=27$)

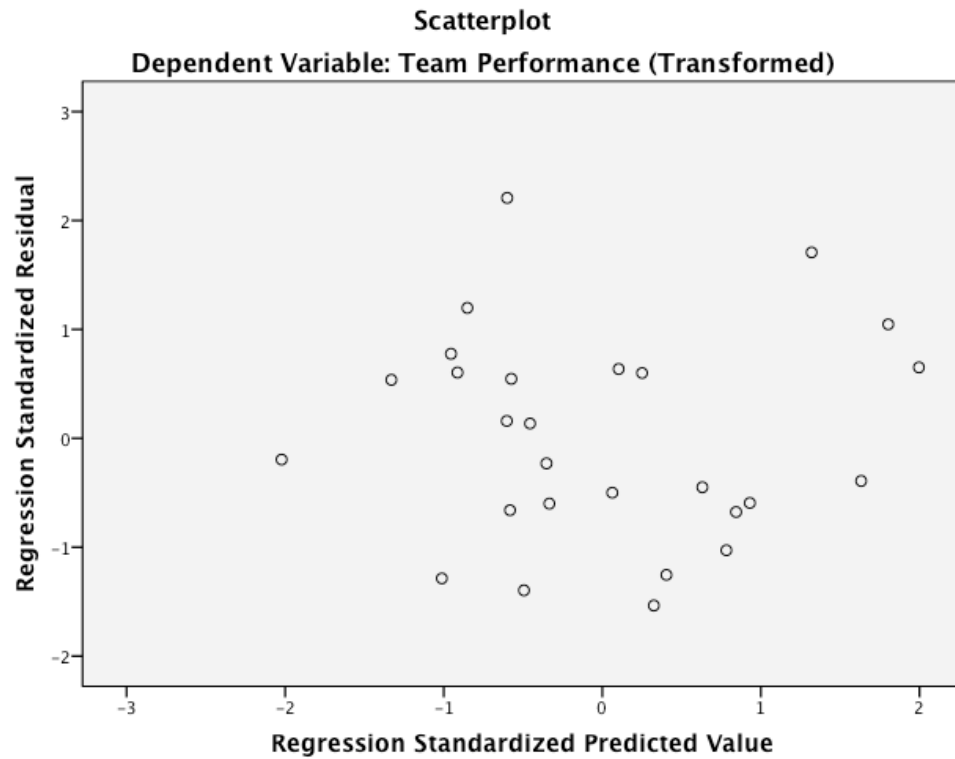


Figure 56. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on weighted average later subgroup coordination reciprocity scores for networks dichotomized based on social faultline strength and social faultline strength. ($N=27$)

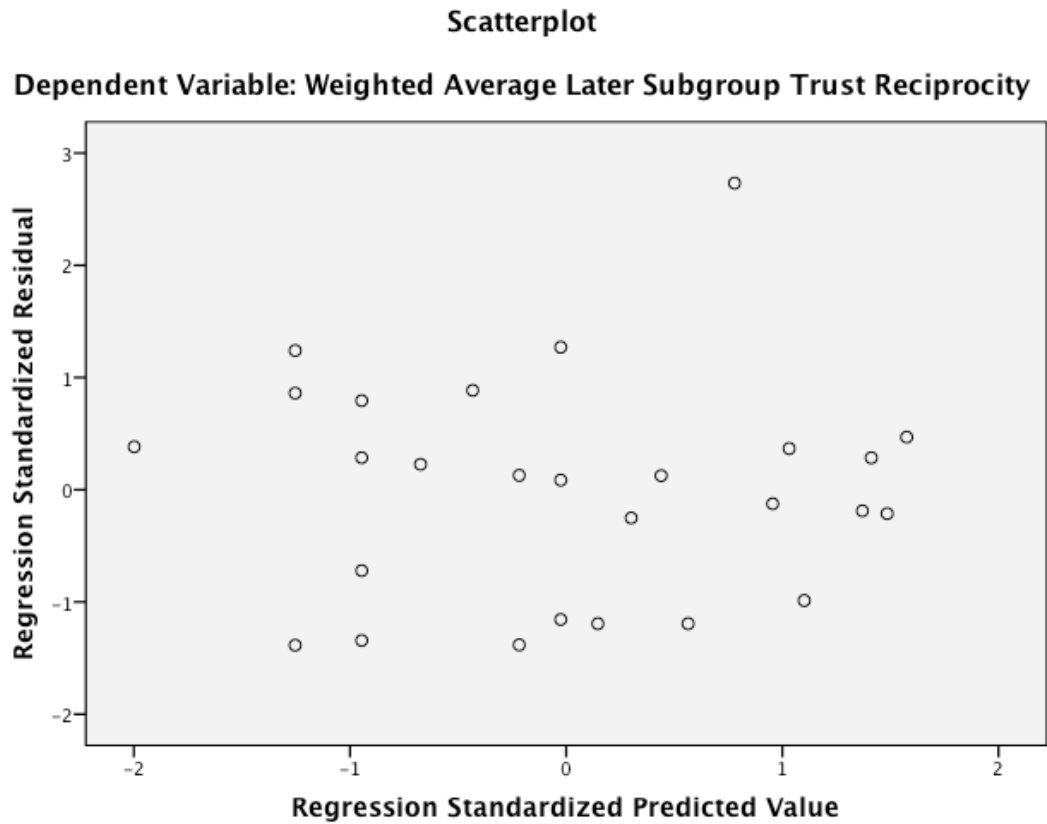


Figure 57. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength on transformed informational faultline strength. ($N=27$)

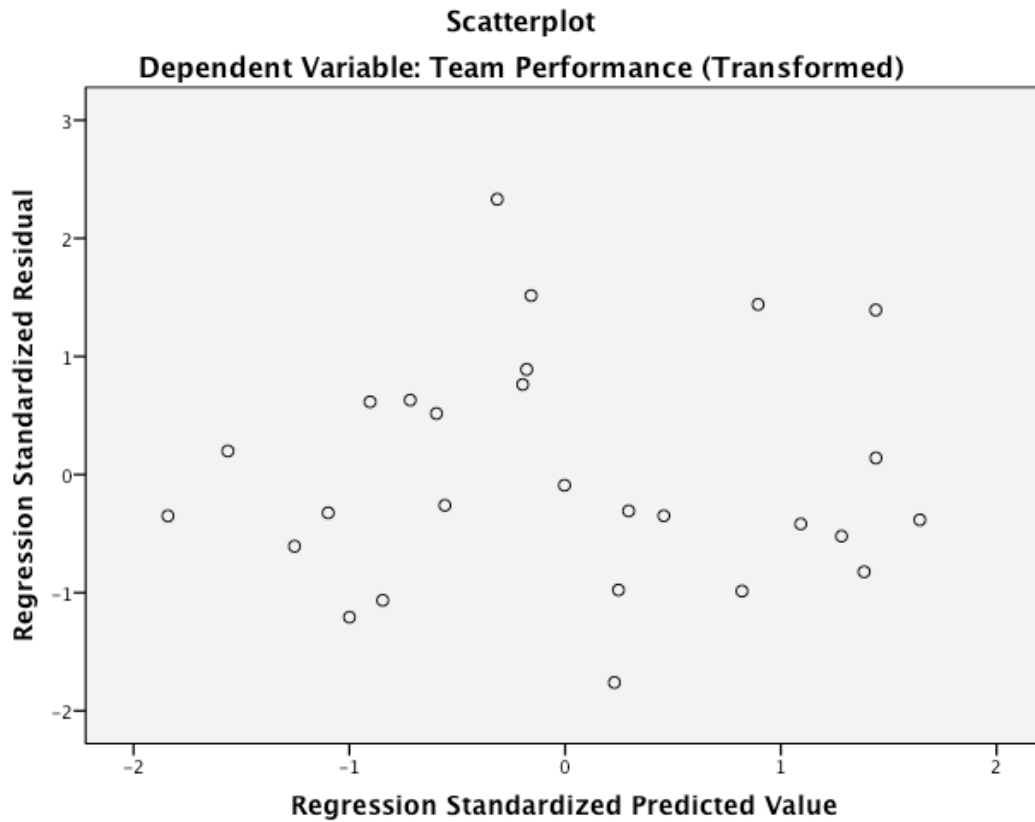


Figure 58. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on transformed weighted average later subgroup trust reciprocity scores for networks dichotomized based on informational faultline strength and transformed informational faultline strength. ($N=27$)

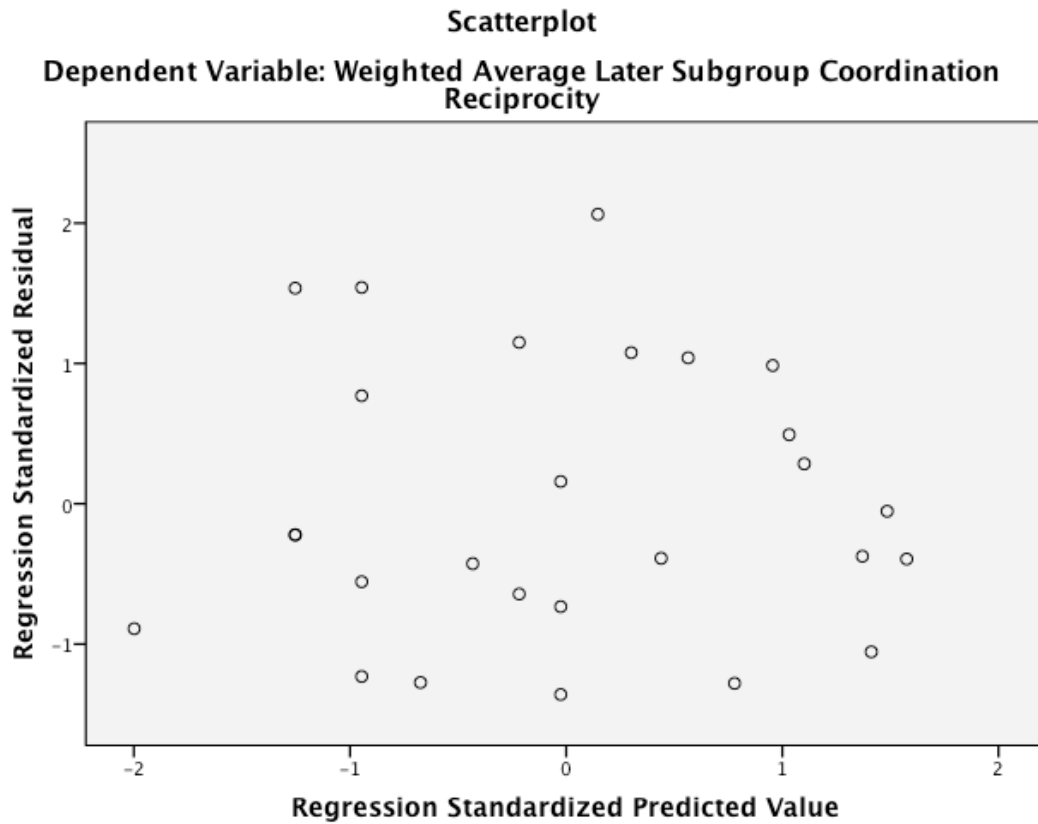


Figure 59. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing weighted average later subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength on transformed informational faultline strength. ($N=27$)

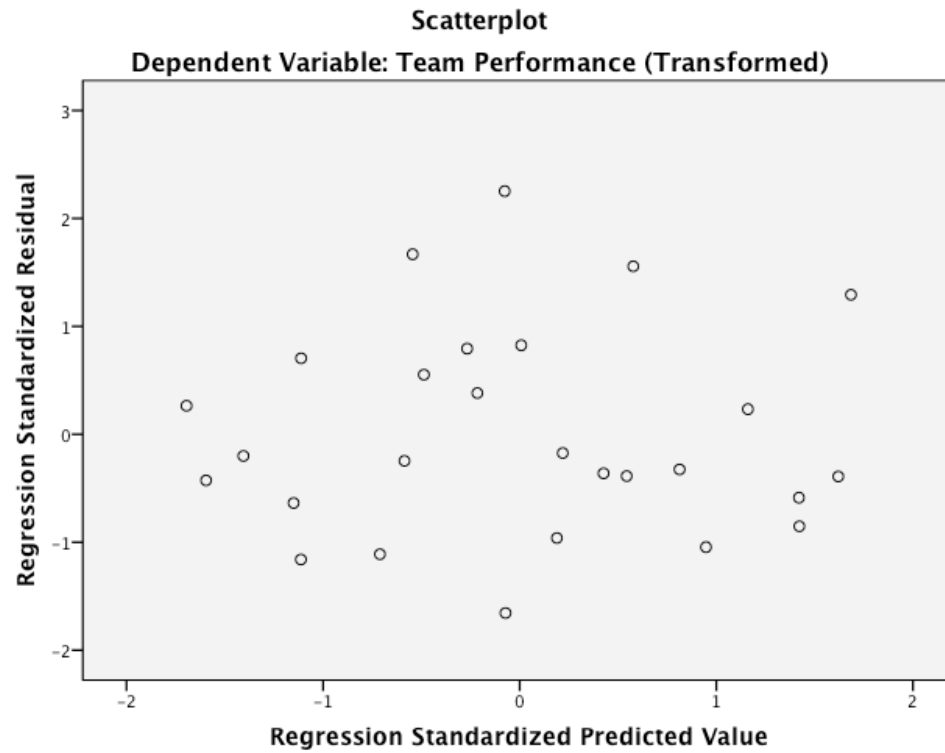


Figure 60. Scatterplot matrix plotting the relation between predicted and observed regression standardized residuals when regressing transformed team performance on weighted average later subgroup coordination reciprocity scores for networks dichotomized based on informational faultline strength and transformed informational faultline strength. ($N=27$)

In addition, the Breusch-Pagan test (Breusch & Pagan, 1979; Waldman, 1983)—which is used to evaluate heteroscedasticity in linear regression models—was carried out. Specifically, this test regresses squared residuals onto independent variables to test whether the estimated variance of errors from a regression are dependent on the independent variables' values. However, the Breusch-Pagan test is sensitive to the normality of the residual distribution. Thus, the Koenker (1981) test, which is still valid even if errors are non-normal and is more powerful than the Breusch-Pagan (Lyon & Tsai, 1996), was used as a supplement. Rejecting the null hypothesis, for both tests, is an indication of heteroscedasticity; therefore, as seen in Tables 15 through 17, the error distributions for the regressions relevant to the current study were relatively homoscedastic.

Table 15

Breusch-Pagan and Koenker Tests for Heteroscedasticity Statistics for Regressions Using Networks Partitioned Based on Social Faultline Strength (N=27)

Independent Variable	Dependent Variable	df	Breusch-Pagan		Koenker	
			Statistic	p value	Statistic	p value
Social Faultline Strength	Team Performance [†]	1	.46	.50	.86	.35
Social Faultline Strength	Average Weighted Early Subgroup Trust Reciprocity [†]	1	.03	.86	.04	.84
Average Weighted Early Subgroup Trust Reciprocity [†]	Team Performance [†]	1	.08	.78	.11	.74
Social Faultline Strength	Average Weighted Early Subgroup Coordination Reciprocity [†]	1	1.16	.28	2.65	.10
Average Weighted Early Subgroup Coordination Reciprocity [†]	Team Performance [†]	1	.00	.97	.00	.97
Social Faultline Strength	Average Weighted Later Subgroup Trust Reciprocity [†]	1	.16	.69	.24	.63
Average Weighted Later Subgroup Trust Reciprocity [†]	Team Performance [†]	1	.25	.62	.35	.56
Social Faultline Strength	Average Weighted Later Subgroup Coordination Reciprocity	1	.26	.61	.15	.70
Average Weighted Later Subgroup Coordination Reciprocity	Team Performance [†]	1	.27	.61	.26	.61

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 16

Breusch-Pagan and Koenker Tests for Heteroscedasticity Statistics for Regressions Using Networks Partitioned Based on Informational Faultline Strength (N=27)

Independent Variable	Dependent Variable	df	Breusch-Pagan		Koenker	
			Statistic	p value	Statistic	p value
Informational Faultline Strength [†]	Team Performance [†]	1	.48	.49	.63	.43
Informational Faultline Strength [†]	Average Weighted Early Subgroup Trust Reciprocity	1	2.22	.14	2.57	.11
Average Weighted Early Subgroup Trust Reciprocity	Team Performance [†]	1	1.67	.20	1.96	.16
Informational Faultline Strength [†]	Average Weighted Early Subgroup Coordination Reciprocity	1	.01	.93	.01	.93
Average Weighted Early Subgroup Coordination Reciprocity	Team Performance [†]	1	.22	.64	.26	.61
Informational Faultline Strength [†]	Average Weighted Later Subgroup Trust Reciprocity [†]	1	.01	.92	.01	.93
Average Weighted Later Subgroup Trust Reciprocity [†]	Team Performance [†]	1	1.21	.27	1.15	.28
Informational Faultline Strength [†]	Average Weighted Later Subgroup Coordination Reciprocity	1	.48	.49	.87	.35
Average Weighted Later Subgroup Coordination Reciprocity	Team Performance [†]	1	.96	.33	1.10	.29

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 17

Breusch-Pagan and Koenker Tests for Heteroscedasticity Statistics for Regressions Using Control Variables (N=27)

Control Variable	Independent Variable	Dependent Variable	df	Breusch-Pagan		Koenker	
				Statistic	p value	Statistic	p value
Social Faultline Strength	Average Weighted Early Subgroup Trust Reciprocity [†]	Team Performance [†]	1	.42	.81	.78	.68
	Average Weighted Early Subgroup Coordination Reciprocity [†]	Team Performance [†]	1	.59	.74	.88	.65
	Average Weighted Later Subgroup Trust Reciprocity [†]	Team Performance [†]	1	.47	.79	1.00	.61
	Average Weighted Later Subgroup Coordination Reciprocity	Team Performance [†]	1	.78	.68	1.05	.59
Informational Faultline Strength	Average Weighted Early Subgroup Trust Reciprocity	Team Performance [†]	1	4.07	.13	5.13	.08
	Average Weighted Early Subgroup Coordination Reciprocity	Team Performance [†]	1	.95	.62	1.23	.54
	Average Weighted Later Subgroup Trust Reciprocity [†]	Team Performance [†]	1	2.53	.28	2.81	.25
	Average Weighted Later Subgroup Coordination Reciprocity	Team Performance [†]	1	2.47	.29	2.94	.23

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Bivariate Correlations Among Focal Variables

Next, covariance and—when applicable—multicollinearity were assessed by evaluating intercorrelations of all variables, as displayed in Tables 18 and 19.

Transformed variables were used in place of variables whose distributions were previously found to be non-normal. In general, the use of transformed variables in place of non-normal variables should be assumed from this point forward. Additionally, all variables included in these 2 tables, save for faultline strength and performance variables, were weighted by subgroup size, and from this point on that will also be assumed rather than continually restated. These analyses revealed several significant correlations of interest.

First, Table 18 displays the intercorrelations between key reciprocity indices for networks dichotomized based on social faultline strength. Essentially, these correlations in this table indicate the degree to which social faultline strength and performance are related to subgroup reciprocity, and the degree to which social faultline strength-based reciprocity scores are related to one another. Of the 3 statistically significant correlations presented in Table 18, 2 were between the same construct measured different time points—early and later subgroup trust ($r=.57, p<.01$) and coordination ($r=.45, p<.05$) reciprocity. Significant correlations between these variables are to be expected, and provide evidence of convergent validity for trust and coordination, respectively. In addition, later subgroup trust reciprocity and later subgroup coordination reciprocity were related ($r=.45, p<.05$), which is acceptable because these predictors are not included together in any of the same regression models.

Table 18

Descriptives and Intercorrelations between Reciprocity Indices based on Social Faultline Strength (N=27)

Variable	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.
1. Social Faultline Strength	.59	.10	1.00					
2. Average Weighted Early Subgroup Trust Reciprocity [†]	.15	.24	.20	1.00				
3. Average Weighted Early Subgroup Coordination Reciprocity [†]	.21	.23	.29	.00	1.00			
4. Average Weighted Later Subgroup Trust Reciprocity [†]	1.28	.33	.18	.57**	.15	1.00		
5. Average Weighted Later Subgroup Coordination Reciprocity	1.92	.70	-.03	-.06	.45*	.45*	1.00	
6. Team Performance [†]	1.10	.26	.30	.19	.28	.16	.26	1.00

Note. * $p < .05$, ** $p < .01$. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 19

Descriptives and Intercorrelations between Reciprocity Indices based on Informational Faultline Strength (N=27)

Variable	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.
1. Informational Faultline Strength [†]	24.09	11.95	1.00					
2. Average Weighted Early Subgroup Trust Reciprocity	1.79	.87	.02	1.00				
3. Average Weighted Early Subgroup Coordination Reciprocity	1.68	.71	.02	.09	1.00			
4. Average Weighted Later Subgroup Trust Reciprocity [†]	.84	.13	-.22	-.49**	-.25	1.00		
5. Average Weighted Later Subgroup Coordination Reciprocity	1.84	1.03	-.14	.22	.37 ⁺	-.69***	1.00	
6. Team Performance [†]	1.10	.26	-.34 ⁺	-.02	-.02	.16	-.07	1.00

Note. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 19 displays the intercorrelations between key reciprocity indices for networks dichotomized based on informational faultline strength. Essentially, these correlations in this table indicate the degree to which informational faultline strength and performance are related to subgroup reciprocity, and the degree to which informational faultline strength-based reciprocity scores are related to one another. Two instances of significant correlations between the same variable at different time points—correlations which, again, indicate convergent validity for said constructs—were observed, between early and later subgroup trust ($r = -.49, p < .01$) and coordination ($r = .37, p < .10$) reciprocity. In addition, later subgroup trust reciprocity and later subgroup coordination reciprocity were related ($r = -.69, p < .001$), which is acceptable because these predictors are not included together in any of the same regression models. Furthermore, informational faultline strength was negatively related to team performance ($r = -.34, p < .10$), but is theoretically meaningful and not indicative of multicollinearity because team performance is a dependent variable.

Hypothesis Tests

Faultline Strength Predicting Subgroup Reciprocity

Hypotheses 1 through 3 were tested first by weighting each subgroup's reciprocity score by subgroup size. Next, in order to bring these subgroup-level scores to the team level, to parallel the team-level predictor—faultline strength—the weighted subgroup reciprocity scores were averaged together:

$$\text{Average Weighted Reciprocity} = \frac{(\text{Reciprocity}_1 * n_1) + (\text{Reciprocity}_2 * n_2)}{2}$$

The two subgroups' reciprocity scores were combined in this way so that all of the variables in the regression model would be at the same level of analysis as faultline strength, at the team level. This average weighted reciprocity score was regressed onto social/informational faultline strength. Thus, following regression model was used to test Hypotheses 1 through 3:

$$\text{Average Weighted Reciprocity} = \beta_0 + \beta_1 X_i + \varepsilon_i$$

In this model, $\beta_1 X_i$ represents the impact of social/informational faultline strength on average weighted reciprocity. In addition, trust and coordination networks for each team were partitioned into subgroups (in order to calculate subgroup-level reciprocity, and carry out further analyses) based on either the strongest social or the strongest informational faultline, depending on the predictor. Due to this model being at the team level, the sample size for analyses was 27.

Hypothesis 1—that social faultline strength would positively predict subgroup trust (1a) and coordination (1b) reciprocity among members of the same subgroup—was not supported by the data. Hypothesis 2—that informational faultline strength would positively predict subgroup trust (2a) and coordination (2b) reciprocity among members

of the same subgroup—was also not supported by the data. Detailed findings for these analyses can be found in Tables 20 through 27 (under mediation step 2, or mediation step a). Hypotheses 3 could not properly be tested because the associated beta weights from testing Hypotheses 1 and 2 were not significant, and therefore not meaningful to compare. Therefore, Hypothesis 3 was not supported.

Table 20

Regression Analyses Testing the Average Weighted Early Subgroup Trust Reciprocity as a Mediator of the Relation between Social Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Social Faultline Strength	-	Team Performance [†]	.09	2.40	.30	1.55	-	-
2 (a)	Social Faultline Strength	-	Average Weighted Early Subgroup Trust Reciprocity [†]	.04	1.00	.20	1.00	-	-
3 (b)	Average Weighted Early Subgroup Trust Reciprocity [†]	Social Faultline Strength	Team Performance [†]	.11	1.42	.14	.70	.27	1.37
4 (c')	Social Faultline Strength	Average Weighted Early Subgroup Trust Reciprocity [†]	Team Performance [†]	.11	1.42	.27	1.37	.14	.70

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 21

Regression Analyses Testing the Average Weighted Early Subgroup Coordination Reciprocity as a Mediator of the Relation between Social Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Social Faultline Strength	-	Team Performance [†]	.09	2.40	.30	1.55	-	-
2 (a)	Social Faultline Strength	-	Average Weighted Early Subgroup Coordination Reciprocity [†]	.09	2.36	.29	1.54	-	-
3 (b)	Average Weighted Early Subgroup Coordination Reciprocity [†]	Social Faultline Strength	Team Performance [†]	.13	1.75	.21	1.04	.24	1.18
4 (c')	Social Faultline Strength	Average Weighted Early Subgroup Coordination Reciprocity [†]	Team Performance [†]	.13	1.75	.24	1.18	.21	1.04

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 22

Regression Analyses Testing the Average Weighted Early Subgroup Trust Reciprocity as a Mediator of the Relation between Informational Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Informational Faultline Strength [†]	-	Team Performance [†]	.12	3.36 ⁺	-.34 ⁺	-1.83	-	-
2 (a)	Informational Faultline Strength [†]	-	Average Weighted Early Subgroup Trust Reciprocity	.00	.01	.02	.11	-	-
3 (b)	Average Weighted Early Subgroup Trust Reciprocity	Informational Faultline Strength [†]	Team Performance [†]	.12	1.62	-.02	-.08	-.34 ⁺	-1.79
4 (c')	Informational Faultline Strength [†]	Average Weighted Early Subgroup Trust Reciprocity	Team Performance [†]	.12	1.62	-.34 ⁺	-1.79	-.02	-.08

Note. ⁺ $p < .10$. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 23

Regression Analyses Testing the Average Weighted Early Subgroup Coordination Reciprocity as a Mediator of the Relation between Informational Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Informational Faultline Strength [†]	-	Team Performance [†]	.12	3.36 ⁺	-.34 ⁺	-1.83	-	-
2 (a)	Informational Faultline Strength [†]	-	Average Weighted Early Subgroup Coordination Reciprocity	.00	.01	.02	.10	-	-
3 (b)	Average Weighted Early Subgroup Coordination Reciprocity	Informational Faultline Strength [†]	Team Performance [†]	.12	1.62	-.02	-.09	-.34 ⁺	-1.80
4 (c')	Informational Faultline Strength [†]	Average Weighted Early Subgroup Coordination Reciprocity	Team Performance [†]	.12	1.62	-.34 ⁺	-1.80	-.02	-.09

Note. ⁺ $p < .10$. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 24

Regression Analyses Testing the Average Weighted Later Subgroup Trust Reciprocity as a Mediator of the Relation between Social Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Social Faultline Strength	-	Team Performance [†]	.09	2.40	.30	1.55	-	-
2 (a)	Social Faultline Strength	-	Average Weighted Later Subgroup Trust Reciprocity [†]	.03	.81	.18	.90	-	-
3 (b)	Average Weighted Later Subgroup Trust Reciprocity [†]	Social Faultline Strength	Team Performance [†]	.10	1.34	.12	.58	.28	1.40
4 (c')	Social Faultline Strength	Average Weighted Later Subgroup Trust Reciprocity [†]	Team Performance [†]	.10	1.34	.28	1.40	.12	.58

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 25

Regression Analyses Testing the Average Weighted Later Subgroup Coordination Reciprocity as a Mediator of the Relation between Social Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Social Faultline Strength	-	Team Performance [†]	.09	2.40	.30	1.55	-	-
2 (a)	Social Faultline Strength	-	Average Weighted Later Subgroup Coordination Reciprocity	.00	.02	-.03	-.13	-	-
3 (b)	Average Weighted Later Subgroup Coordination Reciprocity	Social Faultline Strength	Team Performance [†]	.16	2.28	.27	1.44	.30	1.62
4 (c')	Social Faultline Strength	Average Weighted Later Subgroup Coordination Reciprocity	Team Performance [†]	.16	2.28	.30	1.62	.27	1.44

Note. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 26

Regression Analyses Testing the Average Weighted Later Subgroup Trust Reciprocity as a Mediator of the Relation between Informational Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Informational Faultline Strength [†]	-	Team Performance [†]	.12	3.36 ⁺	-.34 ⁺	-1.83	-	-
2 (a)	Informational Faultline Strength [†]	-	Average Weighted Later Subgroup Trust Reciprocity [†]	.05	1.21	-.22	-1.10	-	-
3 (b)	Average Weighted Later Subgroup Trust Reciprocity [†]	Informational Faultline Strength [†]	Team Performance [†]	.13	1.73	.09	.46	-.33	-1.66
4 (c')	Informational Faultline Strength [†]	Average Weighted Later Subgroup Trust Reciprocity [†]	Team Performance [†]	.13	1.73	-.33	-1.66	.09	.46

Note. ⁺ $p < .10$. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Table 27

Regression Analyses Testing the Average Weighted Later Subgroup Coordination Reciprocity as a Mediator of the Relation between Informational Faultline Strength and Team Performance (N=27)

Mediation Step	Predictor	Control	Dependent Variable	R^2	F	Predictor		Control	
						β	t	β	t
1 (c)	Informational Faultline Strength [†]	-	Team Performance [†]	.12	3.36 ⁺	-.34 ⁺	-1.83	-	-
2 (a)	Informational Faultline Strength [†]	-	Average Weighted Later Subgroup Coordination Reciprocity	.02	.51	-.14	-.72	-	-
3 (b)	Average Weighted Later Subgroup Coordination Reciprocity	Informational Faultline Strength [†]	Team Performance [†]	.13	1.83	-.12	-.62	-.36 ⁺	-1.88
4 (c')	Informational Faultline Strength [†]	Average Weighted Later Subgroup Coordination Reciprocity	Team Performance [†]	.13	1.83	-.36 ⁺	-1.88	-.12	-.62

Note. ⁺ $p < .10$. [†]Transformed variable. All subgroup reciprocity scores were weighted by subgroup size. Sample size reflects the total number of teams.

Subgroup Reciprocity Predicting Team Performance

The following regression equation was used to test Hypothesis 4:

$$\text{Taskforce Performance} = \beta_0 + \beta_1 X_i + \beta_2 X_i + \varepsilon_i$$

The coefficient $\beta_1 X_i$ represents the impact of the average weighted subgroup reciprocity on team performance, the significance of which was used to determine whether the hypothesis should be accepted or rejected. Variation in subgroup size was accounted for by weighting each subgroup reciprocity score by subgroup size. The coefficient $\beta_2 X_i$ represents the impact of the control variable, faultline strength. Hypothesis 4 was not supported by the data. Tables 20 through 27 (under mediation step 3, or mediation step b) display the detailed results related to this hypothesis.

Trust and Coordination as Mediators

Hypotheses 5 and 6 were tested using the Baron and Kenny (1986; Judd & Kenny, 1981) steps, a method that employs regression techniques to estimate paths in a mediational model. In order to test multiple mediators in the same model the mediating variables must be conceptually distinct and not highly correlated (Kenny, 2012); therefore, early and late trust and coordination reciprocity were tested separately from one another rather than in the same model. First, team performance was regressed onto social and informational faultline strength to establish that an effect that may be mediated exists. Tables 20 through 27 (under mediation step 1, or mediation step c) display the results of this first step. Informational faultline strength predicted performance at a statically significant level ($\beta = -.34, p < .10$), but the same did not hold true for social faultline strength. Next, average weighted early and late trust and coordination reciprocity scores were regressed onto social and informational faultline strength to

establish a relation between these two parts of the mediational model; Tables 20 through 27 (under mediation step 2, or mediation step a) display the results of this second step. Faultline strength did not significantly predict average weighted early and late trust and coordination reciprocity, for any of the mediational models. Third, team performance was regressed onto average weighted early and late trust and coordination reciprocity scores while controlling for social and informational faultline strength. Tables 20 through 27 (under mediation step 3, or mediation step b) display the results of this third step. Average weighted early and late trust and coordination reciprocity did not significantly predict team performance, for any of the mediational models. Finally, Tables 20 through 27 (under mediation step 3, or mediation step c') display the results of the fourth step of testing a mediational model, assessing whether a mediational relation is partial or full. Team performance was regressed onto social and informational faultline strength while controlling for average weighted early and late trust and coordination reciprocity scores. Because social and informational faultline strength scores have nonzero relations with team performance, even when controlling for average weighted early and late trust and coordination reciprocity, any observed mediational effects would be partial rather than full. Figures 61 through 64 display all mediational models and corresponding resulting beta weights.

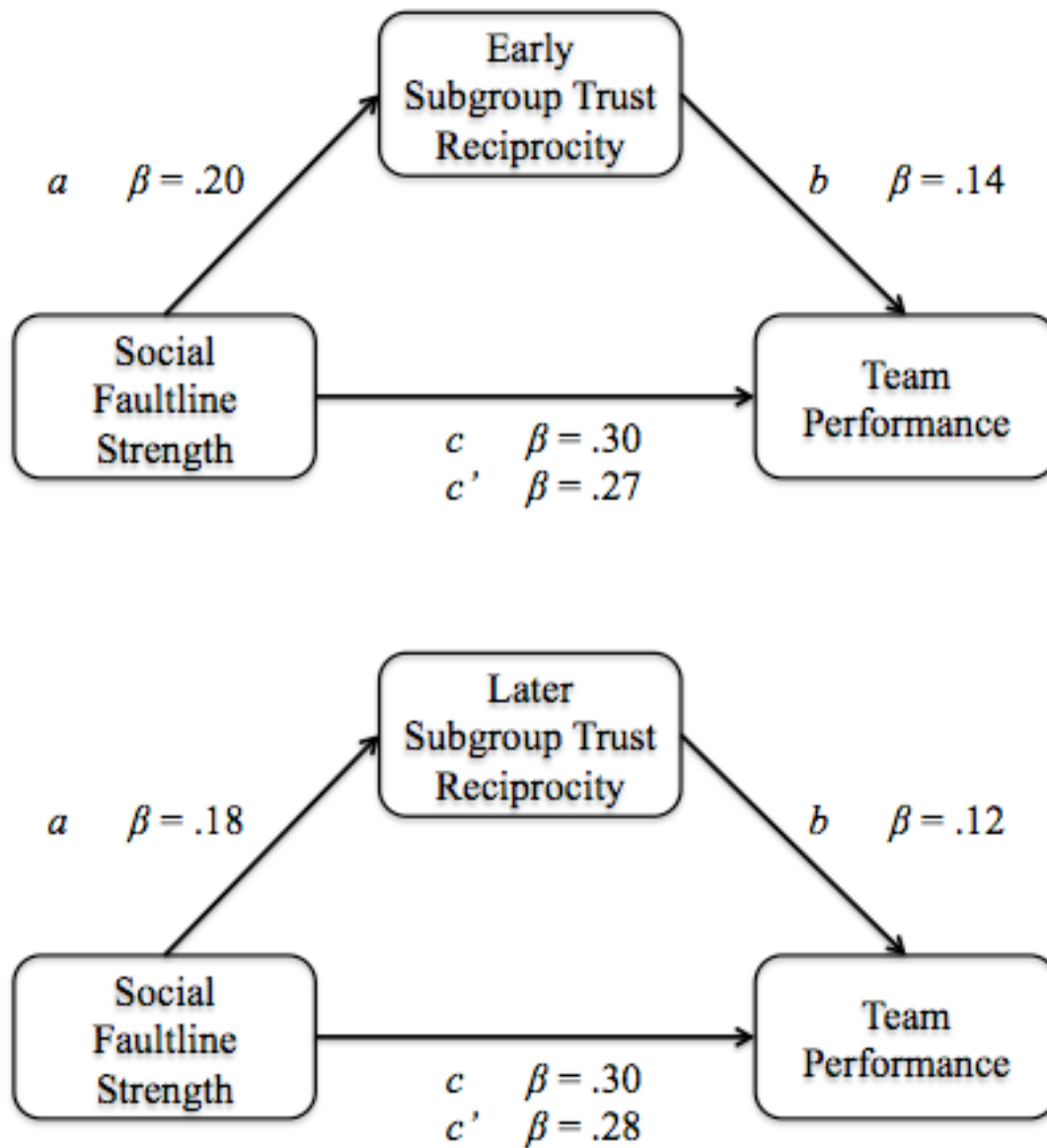


Figure 61. Models depicting subgroup trust reciprocity at 2 time points mediating the relation between social faultline strength and team performance, with associated beta weights. ($N=27$)

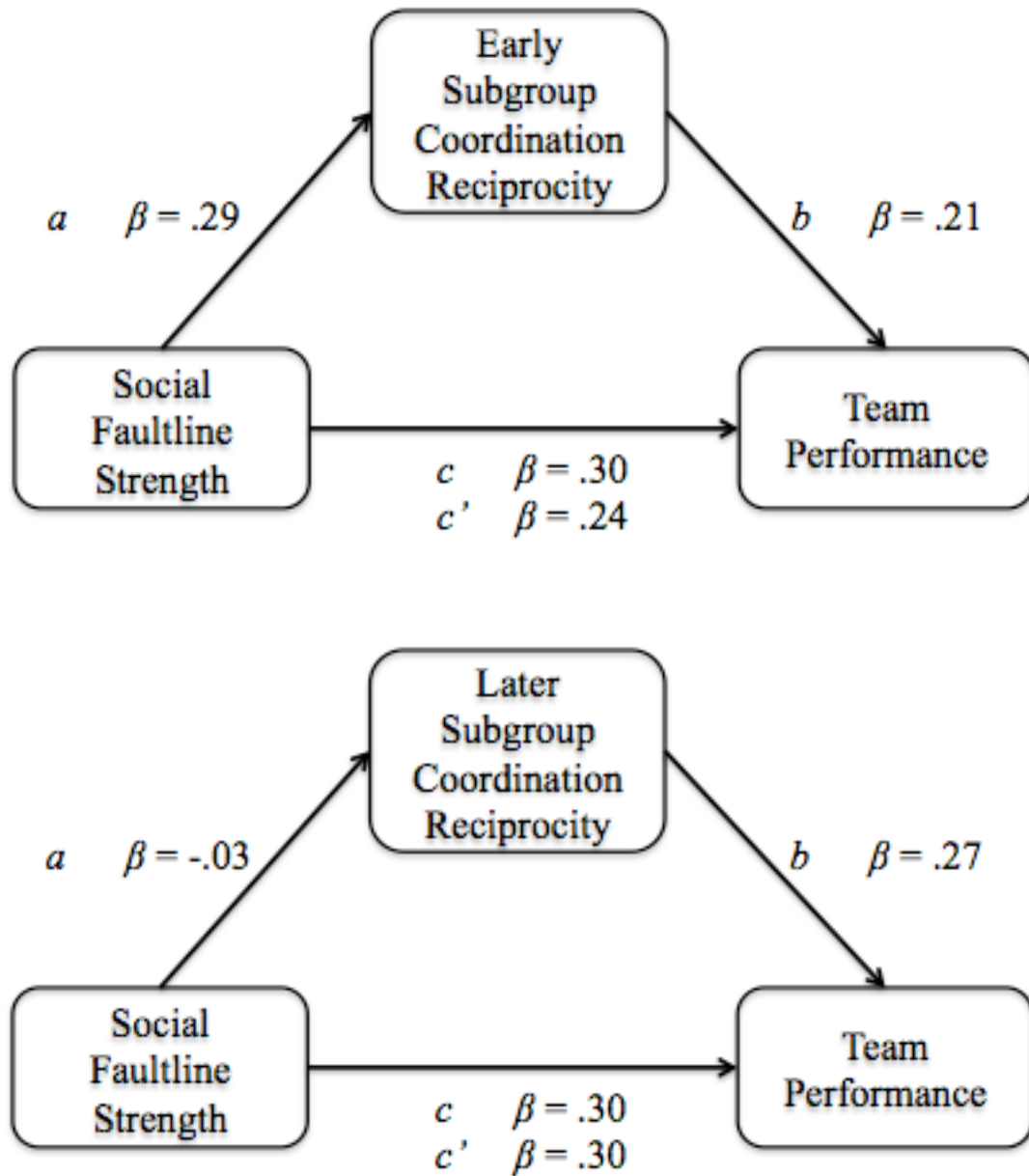


Figure 62. Models depicting subgroup coordination reciprocity at 2 time points mediating the relation between social faultline strength and team performance, with associated beta weights. ($N=27$)

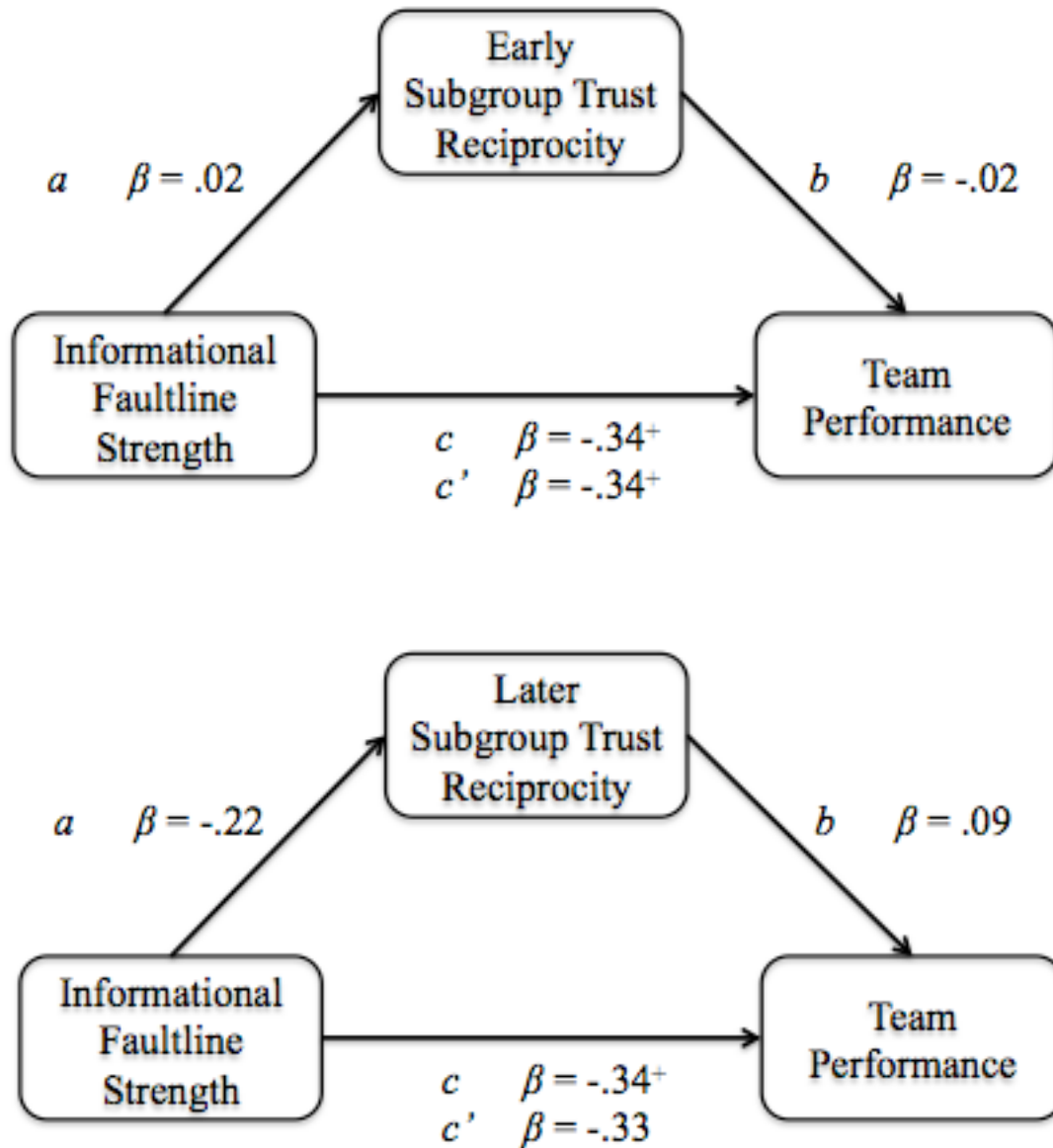


Figure 63. Models depicting subgroup trust reciprocity at 2 time points mediating the relation between informational faultline strength and team performance, with associated beta weights. ⁺ $p < .10$. ($N = 27$)

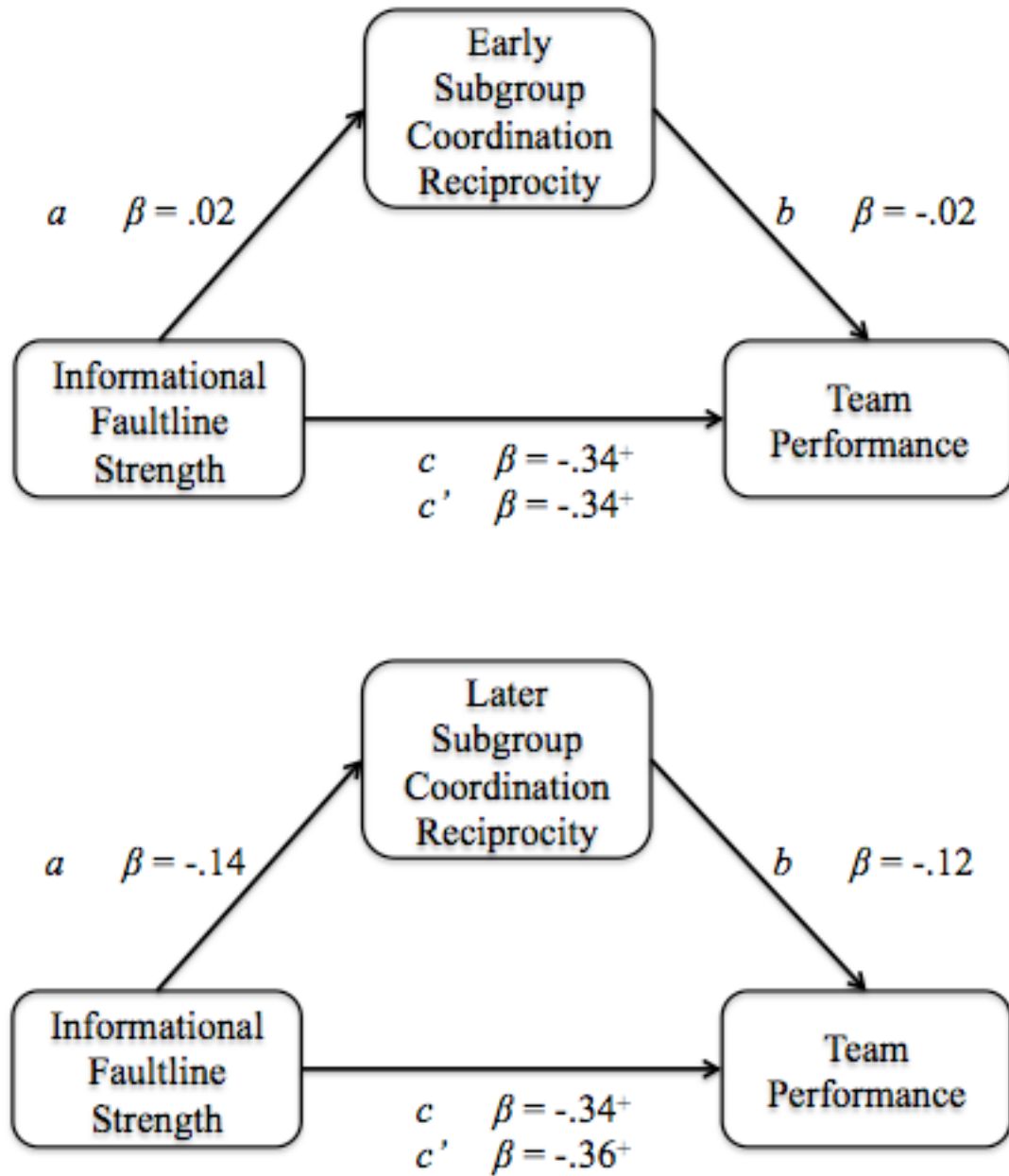


Figure 64. Models depicting subgroup coordination reciprocity at 2 time points mediating the relation between informational faultline strength and team performance, with associated beta weights. $^+p < .10$. ($N=27$)

Overall, Hypotheses 5 and 6 were not supported; only 1 step of the 4 steps was partially met, meaning that the hypothesized models were not supported. Moreover, RMediation (Tofighi & MacKinnon, 2011) was used to test for indirect effects in these mediational models, because sometimes the distribution of an indirect effect is not normal. The resulting confidence intervals from these calculations can be found in Table 28, as well as visual depictions of the confidence intervals in Figures 65 through 72. All confidence intervals included/centered around 0, failing to support Hypotheses 5 and 6.

Table 28

RMediation Confidence Intervals for Testing Hypotheses 5-6

Time Point	Hypothesis Type	Hypothesis Number	Path in Mediation Model	$\mu (\beta)$	SE	CI	
						LL	UL
Early	Social	5a	a	.20	.46		
			b	.14	.22	-.21	.34
	Informational	5b	a	.29	.42		
			b	.21	.23	-.19	.43
		6a	a	.02	.02		
			b	-.02	.06	-.01	.00
Later	Social	5a	a	.18	.64		
			b	.12	.16	-.24	.33
		5b	a	-.03	1.36		
			b	.27	.07	-.78	.76
	Informational	6a	a	-.22	.00		
			b	.09	.41	-.20	.16
		6b	a	-.14	.02		
			b	-.12	.05	.00	.03

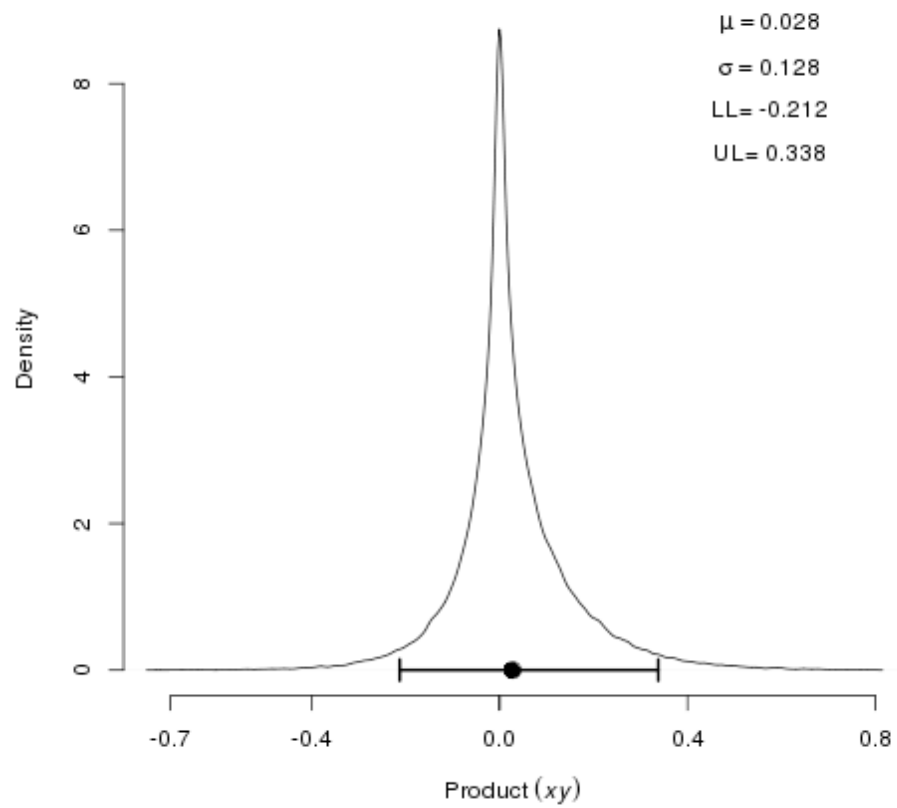


Figure 65. RMediation confidence interval for early trust reciprocity mediating the relation between social faultline strength and team performance.

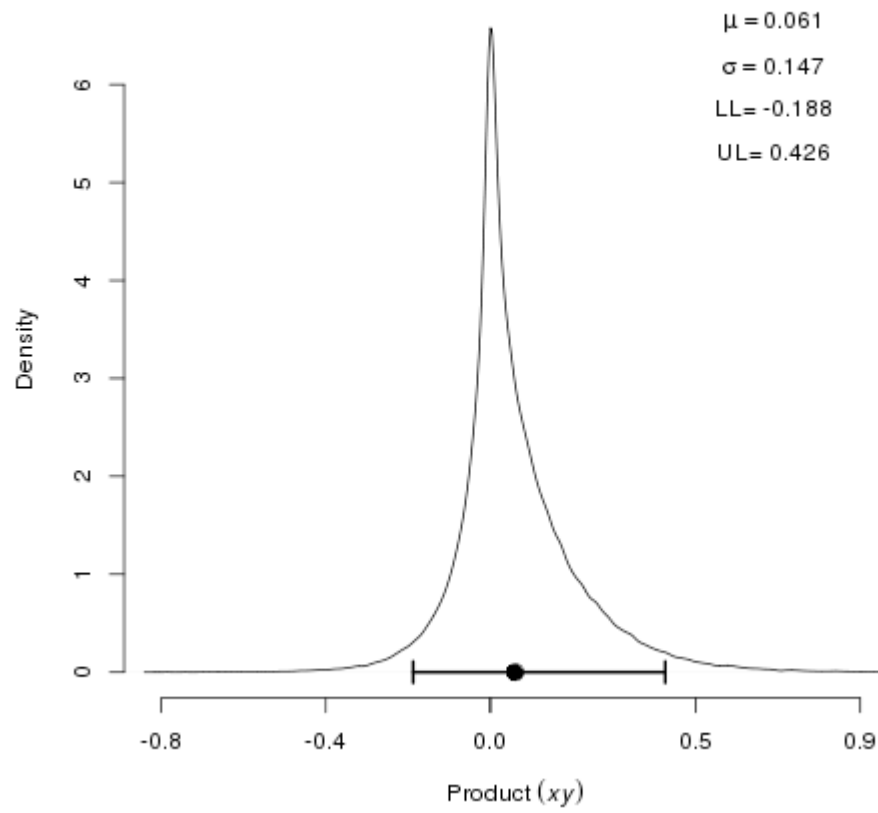


Figure 66. RMediation confidence interval for early coordination reciprocity mediating the relation between social faultline strength and team performance.

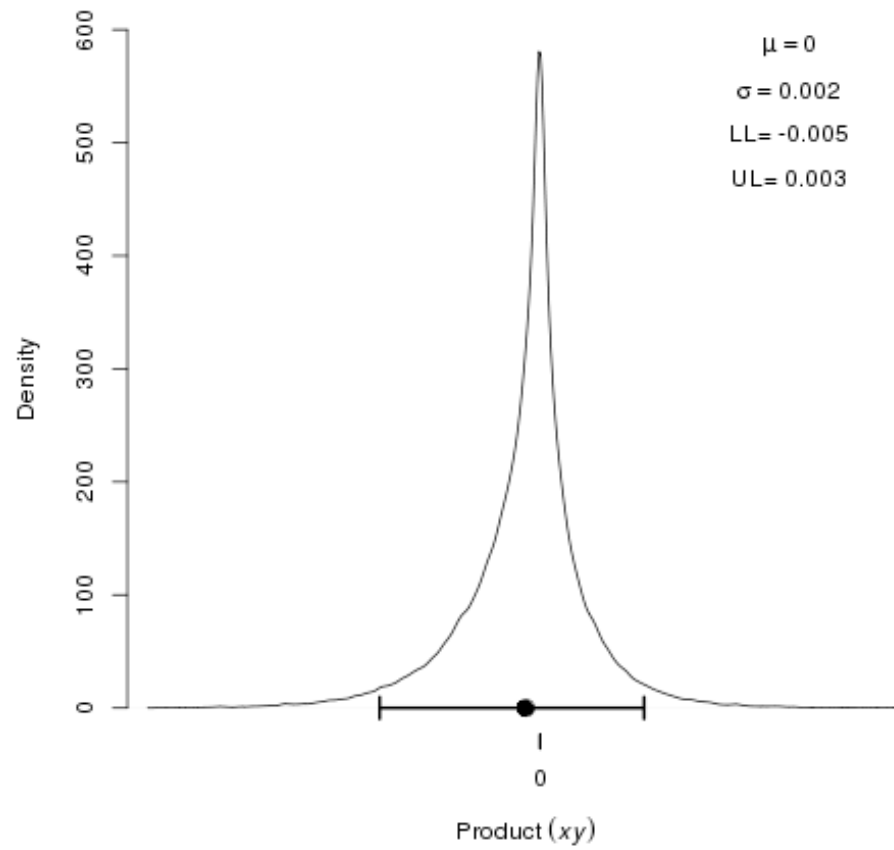


Figure 67. RMediation confidence interval for early trust reciprocity mediating the relation between informational faultline strength and team performance.

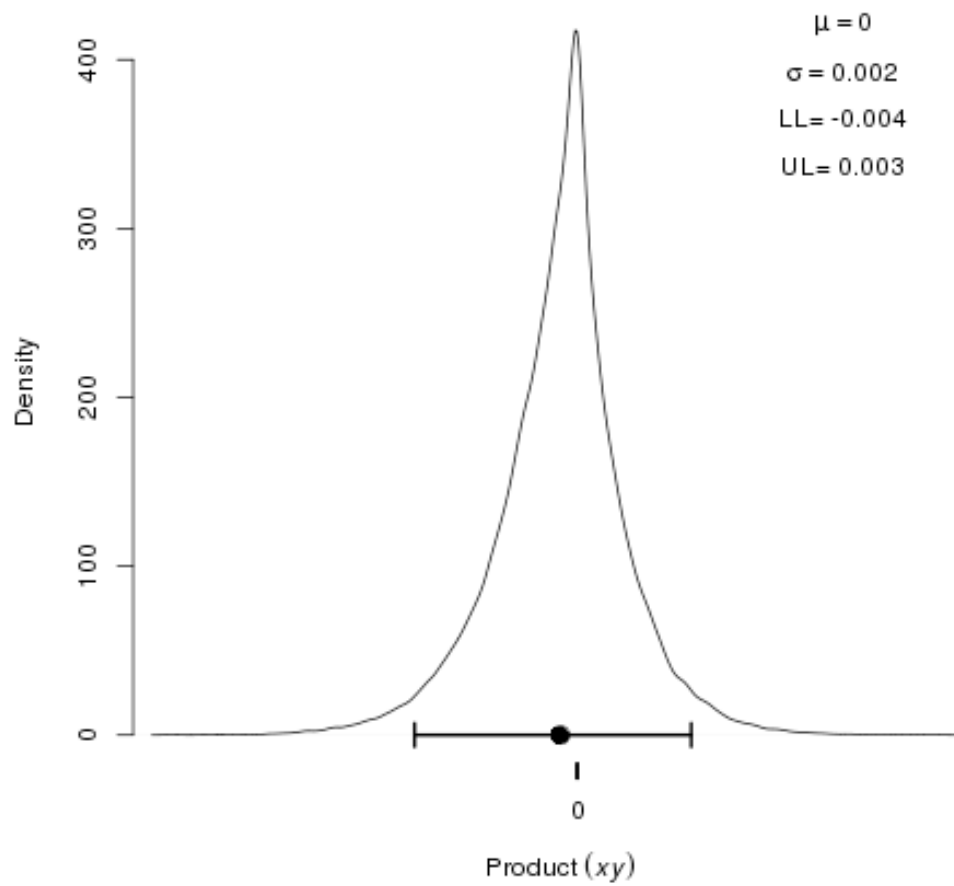


Figure 68. RMediation confidence interval for early coordination reciprocity mediating the relation between informational faultline strength and team performance.

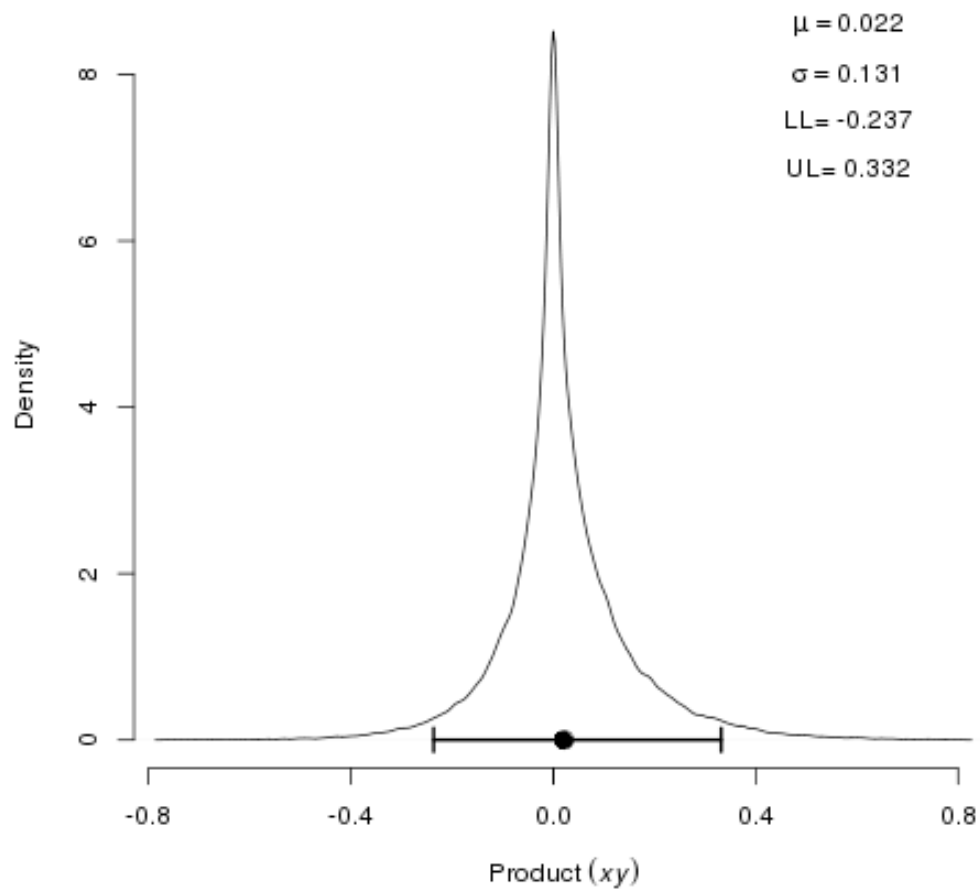


Figure 69. RMediation confidence interval for later trust reciprocity mediating the relation between social faultline strength and team performance.

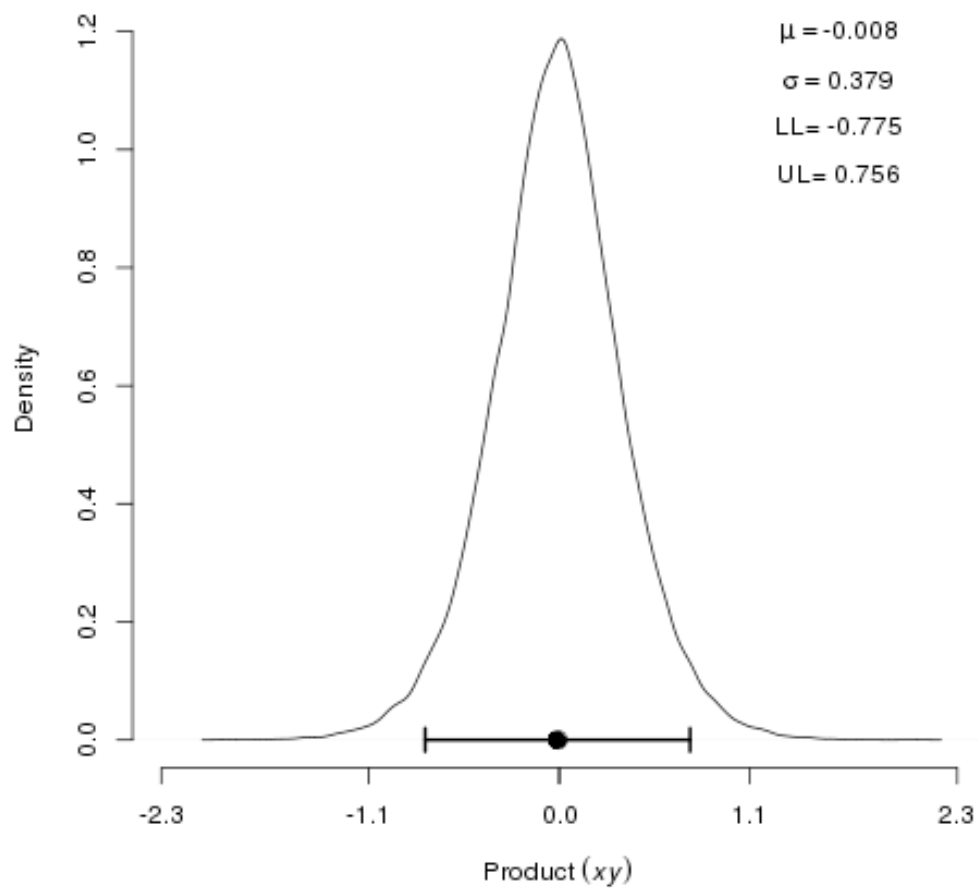


Figure 70. RMediation confidence interval for later coordination reciprocity mediating the relation between social faultline strength and team performance.

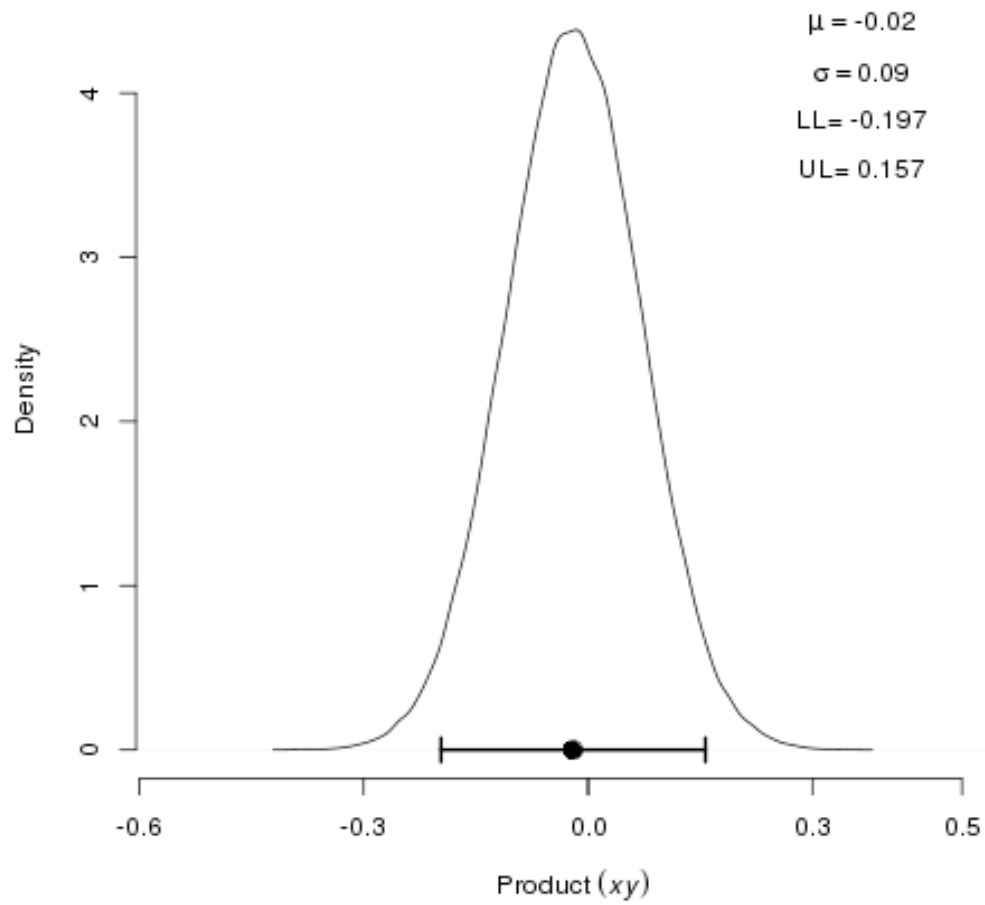


Figure 71. RMediation confidence interval for later trust reciprocity mediating the relation between informational faultline strength and team performance.

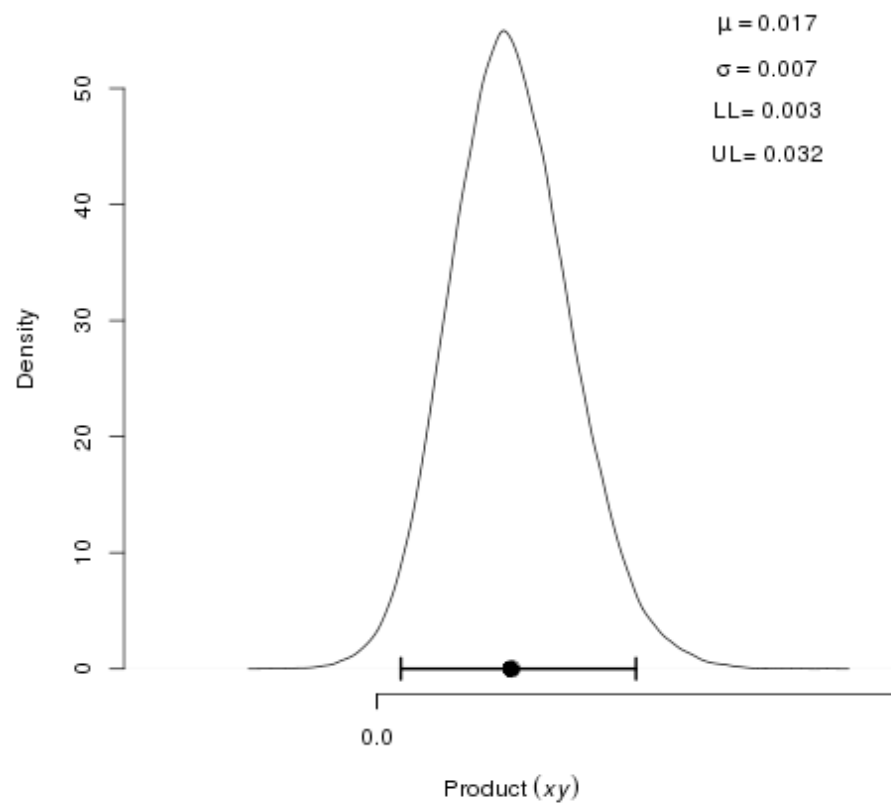


Figure 72. RMediation confidence interval for later coordination reciprocity mediating the relation between informational faultline strength and team performance.

Post Hoc Power Analyses

Post hoc power analyses—the results of which are displayed in Table 29—were conducted in order to compute the achieved power. These analyses were carried out because of the low observed effect sizes that resulted from testing Hypotheses 1 through 6. For an alpha level of .10, which was the alpha level used in the current study, the analyses testing Hypotheses 1 through 4 achieved power levels of .10 to .71, depending on the particular analysis. Given that an acceptable level of power is .80 (Murphy, Myers, & Wolach, 2008), it is likely that low power may have prevented meaningful effects from being detected. The details of all post hoc power analyses can be found in Table 29.

Table 29

Post-Hoc Power Analysis Summary Statistics ($\alpha=.10$)

	Predictor	Criterion	Observed Effect Size (f^2)	Actual Power
Social	Faultline Strength	Early Subgroup Trust Reciprocity	.04	.27
	Faultline Strength	Early Subgroup Coordination Reciprocity	.10	.48
	Faultline Strength	Later Subgroup Trust Reciprocity	.03	.23
	Faultline Strength	Later Subgroup Coordination Reciprocity	.00	.10
	Faultline Strength	Team Performance	.10	.48
	Early Subgroup Trust Reciprocity	Team Performance	.12	.55
	Early Subgroup Coordination Reciprocity	Team Performance	.15	.62
	Later Subgroup Trust Reciprocity	Team Performance	.11	.51
	Later Subgroup Coordination Reciprocity	Team Performance	.19	.71
Informational	Faultline Strength	Early Subgroup Trust Reciprocity	.00	.10
	Faultline Strength	Early Subgroup Coordination Reciprocity	.00	.10
	Faultline Strength	Later Subgroup Trust Reciprocity	.05	.31
	Faultline Strength	Later Subgroup Coordination Reciprocity	.02	.19
	Faultline Strength	Team Performance	.14	.59
	Early Subgroup Trust Reciprocity	Team Performance	.14	.59
	Early Subgroup Coordination Reciprocity	Team Performance	.14	.59
	Later Subgroup Trust Reciprocity	Team Performance	.15	.62
	Later Subgroup Coordination Reciprocity	Team Performance	.15	.62

CHAPTER 4

DISCUSSION

Previous research on team composition and performance has reported a rather weak relation between the two. The current study adopted a relational, faultline perspective of team composition—as opposed to the traditional absolute view of demography—in order to investigate the potential functionality of faultlines as predictors of emergent trust and coordination in teams, as well as how these team processes serve to predict performance. The veracity of these ideas was tested using a sample of 27 teams, composed of 226 participants total.

The current study tested 6 hypotheses, none of which were fully supported. First, faultline strength was not found to significantly impact subgroup reciprocity. One explanation for this lack of findings is that the theoretical explanations provided for the hypotheses are incorrectly applied. Hypotheses 1 and 2 suggested that groups with strong faultlines—and therefore more homogeneous subgroups—would be more likely to reciprocate trust and coordination ties at the subgroup level than groups with relatively weak faultlines. These ideas were justified using the theories of homophily (McPherson, Smith-Lovin, & Cook, 2001), intergroup bias (Hewstone, Rubin, & Willis, 2002), similarity-attraction (Graves & Powell, 1995), and social categorization (Tajfel, 1982). However, it is possible that social and informational faultlines and subgroup trust and coordination reciprocity are unrelated concepts. Hypothesis 3 put forth that social faultline strength would positively predict early subgroup trust and coordination reciprocity more strongly than would informational faultline strength, while

informational faultline strength would positively predict later subgroup trust and coordination reciprocity more strongly than would social faultline strength. However, the lack of findings associated with Hypothesis 3 does not discredit Harrison, Price, and Bell's (1998) theory, which was used to explain the hypothesis, because the fundamental question of the hypothesis could not be tested due to nonsignificant findings from the first two hypotheses. Hypothesis 4 stated that subgroup trust and coordination reciprocity would negatively predict team performance; this supposition was based on previous research on trust and coordination in teams (e.g., Costa, 2003; Tsai, 2002), as well as research on faultlines and performance (Thatcher & Patel, 2011). Again, these hypothesized relations were not observed. Hypotheses 5 and 6 put forth mediational relations based on the relations posited in the previous hypotheses, but were not supported due to the aforementioned lack of findings.

Beyond potential theoretical issues that might account for the unimpressive results for Hypotheses 1 through 4, there are also statistical reasons. It is likely that this sample had insufficient power to detect effects, due to small sample size and a priori and post hoc power analyses support this claim—see Tables 4, 5, and 29 for detailed summaries. Another statistical issue, which may explain the study's results, is the use of faultline scores. Although convincing evidence has been shown for the validity of faultline scores, contemporarily it is preferred to leave measurements in their original, absolute form, rather than subjecting them to score transformations. By changing individual difference variables into faultline scores, potentially meaningful variance from the original variables is lost. Contrasting relative, faultline criteria with absolute criteria could serve to augment faultline score studies. In addition, the artificial dichotomization of trust and

coordination reciprocity relations, based on the subgroups created by the strongest social and informational faultline scores, may explain the lack of findings related to these variables. Naturally occurring subgroup divisions would likely lead to more impressive findings than research-imposed fissions based on theory.

Yet another possible explanation for the amount of nonsignificant findings is that the study targeted the wrong characteristics. Perhaps age gender, narcissism, psychological collectivism, and area of functional expertise are not the particular variables that cause a small group to fracture. Another possibility is the potential faultlines that were calculated were not activated. Faultline activation, or the faultline split being perceived by the individuals in the group, was not measured, so it is impossible to know if these hypothetical divisions had any effect on group processes from the perspectives of the group members themselves. An additional possibility is that the teams were divided into subgroups, but there were more than 2 of them; this study only considered scenarios where the group was divided into 2 component subgroups. This is problematic in some ways; for instance, it does not allow for individuals to cleanly divide into their 3 functional expertise teams, which may have been the case.

Limitations

The most prominent limitation of this study is the low sample size. As demonstrated through power analyses, this low sample size led to very low power in all cases of team-level analyses, and most likely resulted in effects not being detected. In addition, the teams were relatively short-lived; perhaps relations would be more pronounced in a sample measured for longer than 8 weeks, and if relations were measured more than just twice. Also, this study may be less generalizable because it

employed a sample of college students, a group of people that is not necessarily reflective of the general population, especially in terms of some individual difference variables such as intelligence. Furthermore, this study may be limited in terms of generalizability because of the high levels of virtual interaction, and very low average levels of face-to-face interaction, that took place between participants, which are not reflective of how people actually tend to interact. Finally, this study is limited by the common method bias, and the fact that all data is based on self-report.

Implications for Theory and Directions for Future Research

This study takes an important step in terms of further merging faultline research and network analysis, 2 areas that could mutually benefit from each other theoretically and methodologically, but have yet to truly do so. Future research on faultlines should investigate at a variety of different individual different variables that may lead to faultline splits. In addition, prospective faultline studies should measure faultline activation, and should take into account the possibility of faultlines splitting a group into more than two component subgroups. Researchers should specifically investigate the effect of informational faultlines on performance, based on the finding of this study that—in certain circumstances—reciprocity networks bifurcated by strongest informational faultlines predict group performance. Studying informational in addition to social faultlines is particularly important because of the overwhelming preference of past researchers for the latter. Moreover, future research should endeavor to longitudinally assess global virtual teams on an even broader scale, and should attempt to measure variables of interest using multiple different methods over a substantial period of time. Finally, prospective studies could empirically examine more detailed taxonomies of

faultlines and resulting subgroups, such as Carton and Cummings' (2012) identity-based, resource-based, and knowledge-based subgroups.

Conclusion

Figuring out the relationship between faultlines and team processes and performance is the perfect problem space for employing network analytic theory and methodology. This study explored this relatively untouched area of research using a sample of cross-functional, cross-national multiteam systems. Future research can use these findings as a foundation for wedding the faultline and network analysis literature indefinitely.

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